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roblems of Economics

Selected Articles from
Soviet Economics Journals in English Translation

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PROBLEMS OF ECONOMICS

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VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIIA EKONOMIKI – JOURNAL OF MOSCOW UNIVERSITY, ECONOMIC SERIES
VESTNIK STATISTIKI – JOURNAL OF STATISTICS
VNESHNIAIA TORGOVLIA – FOREIGN TRADE
VOPROSY EKONOMIKI – PROBLEMS OF ECONOMICS
MIROVAIA EKONOMIKA I MEZHDUNARODNYE OTNOSHENIIA – WORLD ECONOMY AND INTERNATIONAL RELATIONS
NAUCHNYE DOKLADY VYSSHEI SHKOLY – EKONOMICHESKIE NAUKI – SCIENTIFIC PAPERS OF HIGHER EDUCATIONAL INSTITUTIONS, ECONOMIC SCIENCES
PLANOVOE KHOZIAISTVO – PLANNED ECONOMY
EKONOMICHESKAIA GAZETA – ECONOMIC GAZETTE
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COMPARISONS OF SOVIET AND US ECONOMIES

Vestnik Statistiki, No. 1, 1961

. PAVLOV AND V. SOBAKINSKIKH:

Comparison of Soviet and US Levels of Agricultural Output

The Soviet people are successfully implementing eir Seven-Year Plan of economic development. his is a decisive step in realizing the basic eco- mic goal of the USSR: to match and surpass the pitalist countries in per capita production within e shortest historical period.

The seven-year program of agricultural develop- ent of the USSR, mapped out with due regard for is goal, can justly be called a tremendous one. his makes the successes already achieved even ore significant. The first year of the seven-year riod, 1959, witnessed a further advance of agri- ltural production.

Despite unfavorable weather conditions the grain rvest (125.9 million tons) was in excess of the erage between 1954 and 1958. Cotton production 1959 (4.68 million tons) was at an all-time high r our country. Meat production in 1959 (8.9 mil- on tons, slaughter weight) increased by 16% with- one year, with a simultaneous growth in the mber of livestock. As compared with 1953 meat oduction showed a 50% increase in 1959. In 1959, compared with 1958, the production of milk in- eased 5%, butter — 8%, eggs — 9%, and wool — %.

Although weather conditions were also unfavora- e for Soviet agriculture in 1960, the level of farm oduction was high and some branches registered bstantial increases.

Begun on the initiative of leading collective and ate farms, the movement to match and surpass e United States — the most developed capitalist untry — in the basic animal husbandry products now well under way and is yielding great re- lts. The Soviet Union's total milk output reached at of the United States in 1958, and surpassed it in 59. In 1959 the USSR exceeded the USA in per pita butter production.

The Soviet people's impressive achievements in riculture cannot be doubted. Yet, contrary to erwhelming evidence, the opponents of socialism empt to describe the agriculture of the USSR as conomically backward."

Many recent publications in the United States have been aimed at belittling the Soviet people's economic and cultural advance and at representing the economic development of the USA in a favorable light. In 1957 the Joint Economic Committee of the Congress of the United States published a report to convince the public of the advantages of capitalism over socialism and to demonstrate the unrealistic nature of the target set by the Soviet people: to match and surpass the USA in per capita production. A similar symposium published in 1959 and concerned with a comparison of the economic development of the USSR and the USA again referred to the "underdevelopment" of agriculture in the USSR and its "inability" to meet the growing demand for food products.

There is ample evidence to refute these allegations. Suffice it to compare the output of basic agricultural products in the USSR and the USA. The table shown on the following page gives the data for 1958 and 1959.

The USSR is still behind the USA in the production of grain, cotton and meat, but has a considerable lead in milk, wool and potatoes, as well as in sugar beet, even if sugar cane and sugar beet are taken into account with allowances for their sugar content.

The basic products listed in the table account for 70% of the total value of all agricultural output in the USSR and USA alike. Consequently our comparative data are sufficiently representative. Nevertheless, comparative analysis of agricultural production in the USSR and the USA deserves more detailed examination. The purpose of the present paper is to shed some light on certain methodological problems of this comparative analysis.

***

As a branch of the economy, agriculture has a number of specific features stemming from its close dependence on the whole pattern of natural conditions and the biological processes at work in the growth and development of plants and animals. This by no means contradicts the fact that the knowledge and experience accumulated by mankind, as well as the progress of science and technology, Output of Major Agricultural Products in the USSR and the USA in 1958 and 1959*

	USSR (million tons)		USA (million tons)		USSR in % of USA	
	1958	1959	1958	1959	1958	1959
Grain	141.2	125.9	186.7	184.9	76	68
including:						
wheat	76.6	69.1	39.8	30.7	192	225
corn	16.7	12.0	96.5	110.8	17	11
Sugar beet	54.4	43.9	13.8	15.5	394	283
Raw cotton	4.4	4.7	7.5	9.6	58	49
Potatoes	86.5	86.6	12.0	11.0	718	787
Milk	58.7	61.7	56.6	56.4	104	109
Meat and fat (slaughter weight)	7.7	8.9	16.3	17.4	47	51
Wool (thousand tons)	322	356	142.5	149	226	239

* Statistical Yearbook, *Narodnoe Khoziaistvo SSSR v 1959 godu*, Gosstatizdat, Moscow, 1960; Statistical Collection, *Selskoe Khoziastvo SSSR*, Gosstatizdat, Moscow, 1960; *Crop Production, Annual Summary*, USDA, December 1959; *National Food Situation*, Washington, 1959.

enable us to increasingly influence nature and biological processes for the purpose of increasing agricultural production.

Any comparative analysis of the agricultural output levels of the USSR and the USA must not overlook essential differences in the natural and climatic conditions of the two countries. The territory of the United States is situated further to the south than that of the Soviet Union. The northern border of the United States lies along the 45th parallel, which corresponds roughly to the latitude of Poltava and Stalingrad, while the southern border reaches the 26th parallel and even further to the south, which corresponds to the northern part of Africa and the south of Iran. True enough, the climate of the USA is somewhat more severe than in Europe in the same latitudes, yet the fact remains that over most of the USA territory it is more favorable for agriculture than in many areas of Europe.

Areas with average temperatures below $+5^{\circ}$C account for 0.6 of all land under crops in the USSR, but only for 0.1 in the USA. More than 50% of the farm land of the USA lies in areas with annual temperatures averaging above $+10^{\circ}$C, while the corresponding for the USSR is less than 10%. The January and July average temperatures of the mid-European part of the USSR are observed only in the northern part of the USA close to its Canadian border. T the territory of the USA in which the basic crop are concentrated is almost free from areas like those situated in the podzolsod soil of the middl and north belts of the European part of the USSR

Because of long winters the crop vegetation p riod is shorter in most of Soviet territory than the USA. The first autumn frosts and the late spring frosts occurring throughout the USSR reduce the vegetation period and shorten the time available for spring and autumn work. Some 30 all areas in the USA have a non-frost period of l than 170 days, while more than 85% of all ploug land in the USSR comprises such areas. Over of the ploughed land lies in areas with a non-fro period of more than 170 days in the USA, while corresponding figure for the USSR is less than In the USA there are no farm areas with a non-frost period of less than 120 days. In the USSR the other hand, nearly a fifth of the cultivated la is situated in areas with a non-frost period of l than 120 days.

Drought is another cause of agricultural loss in the USSR, while most farming areas in the U are free from this. Nearly 40% of the farm lan the USSR receives no more than 400 mm. of pr cipitation annually. In the USA only 10% of agri tural land is accounted for by such areas. Ove

0% of the farm land in the USA is located in areas vith over 700 mm. of annual precipitation. Only 1% f the farm land in the USSR covers areas with so igh a precipitation. Hardly any part of the tradiional agricultural areas of the USA — north and outh — accounting for 80% of all marketable farm roducts according to the 1954 census, is ever tricken by drought. Moreover, most of the preciptation there occurs during the period of the growth f plants. (1)

Winter frosts nearly all over the Soviet Union afect cattle raising. The outdoor care of cattle in vinter is impossible except in some southern areas. n the USA, on the other hand, there are more faorable conditions for winter cattle management beause of the mild climate. Extensive pasture areas an be used all year round.

By and large, most of the basic farming areas in he United States have more favorable climatic conlitions than those in the Soviet Union.

Taken against this background, the immensity of he task of matching and surpassing the USA in per apita agricultural production can be appreciated. Yet this task has been set with due allowance for all actors and it will be fulfilled by the Soviet people. Iowever, the differences in the climatic conditions f the two countries should not be neglected when ve analyze the relationship that has developed beween the agricultural output levels of the two counries and the Soviet Union's progress towards its oal.

"The level of output in the USA is the ceiling vhich the economy of capitalism has been able to each," said Comrade N. S. Khrushchev at the 1st Congress of the CPSU. "We know that favorale historical and natural conditions have played a art in this. To exceed the US level means to surass the highest indices of capitalism."

***

In comparing the agricultural output of the USSR nd the USA the methods used require special atention. It is essential, above all, to determine vhether there is an index in US statistics reflecting otal agricultural output analogous to the gross outut index calculated for Soviet agriculture. Total gricultural production in the USSR is described by ne index of "gross agricultural output," defined as ne total value of crop and livestock output for a alendar year.

Under the heading, crop output, is included the alue of the gross harvest of a given year (grains, echnical crops, fodder crops, vegetables and nelons, potatoes and other crops) as well as fruits, erries and other perennials, exclusive of forest roducts. To determine the value of crop output for calendar year the aggregate value of the above-mentioned products obtained in the given agricultural year is corrected for the change in the value of unfinished production from the beginning to the end of year. The value of unfinished production includes outlays on preparing the soil and sowing winter crops, as well as outlays on preparing the soil for the sowing of spring crops to be harvested in the following year. In addition, crop output includes the cost of growing young perennial plants comprising the outlays in the given calendar year on planting and tending the young perennial implantations of fruit, berries, technical crops, flowers and ornamental plants.

Livestock output is determined by the value of the calendar year's offspring and the growth of the young stock reared within a year, the value of the increased weight of the cattle as a result of fattening, as well as the value of milk, wool, eggs and other produce resulting from a productive use of cattle and poultry exclusive of slaughter. In addition, livestock output incorporates the value of fur-animal farming, apiculture, silk-worm breeding, and fishing.

US statistics calculate and publish several indices describing the country's agricultural output as a whole. Some of these involve the monetary value of farmers' total income from agricultural production and do not correspond, in their composition, to "gross agricultural output." Moreover, these indices are often available in current prices only, and no analysis of changes in agricultural production over time is possible on the basis of these data.

Two indices calculated by the US Department of Agriculture — "farm output" and "gross farm production" are the closest equivalents of the relevant Soviet indices. Unfortunately, these indices are not published regularly in absolute terms.

"Farm output" is available in the form of a general index (1947 to 1949 = 100) and separate indices for crop and livestock output. (2) This index is used in the Soviet Union to characterize changes in the total volume of US farm output and in the output of the two separate branches — crop production and cattle raising. The general index is also used quite often to compare the rates of agricultural growth of the USA and the USSR. "Gross farm production" is computed in the USA by adding the value of herbal seeds and integumentary crops and the cost of the production of draught animals to the output assessed in calculating "farm output."

Do these indices correspond to the gross agricultural output index of the USSR as far as their composition is concerned? Comparison of the composition of outputs used as the basis for calculating farm output in the USA and gross agricultural output in the USSR reveals that the two are not comparable. Thus, in the US crop output index no account is taken of the cost of raising young perennial implanatations, the value of flowers and ornamental plants, subsidiary grain products (straw, chaff, etc.), or changes in the value of unfinished production in agriculture. In the US livestock output index no account is taken of the value of rabbit-breeding, fishing, fur-animal farming, the output of some species of fowl (ducks and geese), and a number of other items. True enough, the share of these products in total output is not large: in the USSR they account for only 3% of gross agricultural output.

As indicated above, in computing "farm output" in the USA no account is taken of the value of output of draught animals (horses and mules) and the value of herbal seeds and integumentary crops. This may suggest that "gross farm production," which takes account of these factors, is closer in composition to the Soviet index of "gross agricultural output." This is not the case however.

First of all, the method of computing the value of output of draught animals in the USA differs from that accepted in Soviet statistics. US statistical agencies incorporate the value of live draught stock in addition to the value of offspring and the growth of young draught stock (horses and mules) in computing the value of output. The value of live draught stock is determined by the value of the fodder consumed, the outlays on tending the draught cattle, the farm inventory depreciation allowances and the interest on capital invested. In Soviet statistics, in calculating gross agricultural output account is taken only of the value of offspring and the growth of young draught stock. The value of draught power is not included in "gross agricultural output" in the USSR. This difference should be borne in mind, although the value of draught stock does not account for a sizable share of total agricultural output and is decreasing annually because of the progress of mechanization.

The value of non-pasture fodders consumed in cattle raising and incorporated in crop production is excluded in US statistics when crop and livestock output are totalled. According to US statistics, from 1947 to 1949 the average value of non-pasture fodders accounted for approximately half of the value of US livestock production inclusive of the value of these fodders. (3) Yet the method employed by US statisticians to calculate the value of the fodder consumed is rather arbitrary. The share of the fodder consumed in the value of livestock output for each type of cattle is determined from data of sample studies conducted once in a decade or even at rarer intervals. The data obtained in these studies are used to calculate the amount of fodder in subsequent years. Yet changes in weatl er conditions, as well as market fluctuations, affect the amount, composition and value of the fodder consumed. Therefore its share in the total value of livestock output also changes accordingl The use of the same data for several years — the practice in US statistics — fails to reflect the actual situation. In the USSR the value of the fod der consumed is not excluded from livestock outp because annual calculations of this would be too complicated.

In other words, there are no data available in finished form to compare the total agricultural o put of the two countries. How then can sufficient accuracy be cchieved in a comparative analysis? The solution is to compare agricultural output in the USSR and USA as calculated on the basis of a certain general methodology.

One of the simplest and most feasible techniqu is the method of evaluating, in money terms, the agricultural output of the countries being compar However in measuring total agricultural output i money terms it is essential to reduce to a minimum the influence of differences in the structure of output and the price levels of individual farm products in the USSR and the USA. The output of both countries therefore is expressed both in rubles and in US dollars: the agricultural output of the USSR and the USA is valued in average weighted prices of marketed and non-marketed products, these prices being known in the USSR a the comparable prices for calculating the physica volume of gross agricultural output in rubles. Simultaneously, this output of both countries is evaluated in US average weighted farmers' price in dollars.

The following should be borne in mind regardi the comparable range of farms and the composition of agricultural output in the USSR and the US In the total agricultural output of the USSR accou is taken of the production of collective farms, st farms and other state agricultural establishment as well as private subsidiary farm plots owned b collective farmers, workers and employees plus the output of individual peasants from their priva farms and of other sections of the population. F the USA account is taken of the output produced farms. A certain fraction of agricultural output the USA is produced on units so small that they not considered as farms according to the criteri accepted in US statistics. In the past this output accounted for an insignificant share of total production, and now it has practically vanished for some products, and for others is so negligible t it is not taken into account. In the total agricultu output of the USA this produce can be taken as equivalent to that obtained by individual peasants from their private farms in the USSR, i.e., roughly 0.1% of the country's total agricultural output in 1959. Since the value of this output has no effect on the relation between the output levels of the two countries, no allowances were made for the output of these farms.

The composition of output of the two countries cannot and should not be expected to coincide completely in the comparative analysis, for there are obvious differences in the structure of agricultural output in the USSR and the USA. The agricultural output of the USSR includes crops not found in US production, and conversely, there are crops typical of the USA alone. Obviously a statistician should not confine himself to a set of products common to both countries in his comparative analysis. All crops should be taken into account. In calculating the value of US produce, therefore, account is taken of all output registered in the US statistics plus the production of fodder left out of US calculations. As for the agricultural output of the USSR, only those products are excluded which are not considered in US statistics, although produced in both countries.

Thus, the total agricultural output of both countries is calculated according to the method used to compute the gross output of the USSR.

This method of comparing the agricultural output of the USSR and USA makes it perfectly possible to compare the absolute output totals and gauge the actual relationship between the output levels of the two countries.

The total value of gross agricultural output in the USSR in 1959 amounted to 47 billion rubles in comparable prices of 1956. (4) Gross agricultural outputs (crops and livestock products) in the USSR and the USA as calculated by the above method for 1959 amounted to:

USSR	USA	USSR in % of USA
(in billion rubles)		
45.5	59.2	77

If these products are evaluated in dollars, the gricultural output of the USSR is found to be 80% f that of the USA.

The discrepancy in the relationships between the gricultural output of the two countries in rubles nd dollars is attributable to different price levels or agricultural products in the USSR and the USA.

The above calculation shows that total agricultural output in the USSR was some 20 to 25% less than that of the USA in 1959. This comparison, as well as the comparison of agricultural output in physical terms, makes nonsense of the bourgeois economists' allegations concerning the present status of agriculture in the USSR.

As for the prospects of development there is ample evidence that the Soviet Union's socialist agriculture has unquestionable advantages over the capitalist agriculture of the USA in regard to the growth and improvement of production. These advantages are reflected in marked difference in the rates of growth of agricultural output in the two countries.

Average Annual Rates of Growth of Gross Agricultural Output in the USSR and the USA*
(in %)

	USSR	USA
For 15 years (1945-1959)	6.7	1.7
Including the last six years (1954-1959)	7.0	2.3

* Statistical Yearbook, Narodnoe Khoziaistvo SSSR v 1959 godu, Gosstatizdat, Moscow, 1960, p. 110.

By making use of the advantages of the socialist economic system, the Soviet people are confidently solving the problem of creating an abundance of agricultural products.

Footnotes

(1) Climate and Man, Agricultural Yearbook, USDA, Washington, 1941.

(2) Agricultural Statistics, US Department of Agriculture; The Handbook of Basic Economic Statistics, published monthly by the Economic Statistics Bureau of Washington, p. 84.

(3) Major Statistical Series of the US Department of Agriculture, Handbook No. 118, Washington, 1957, Vol. 2, p. 38.

(4) Statistical Collection, Selskoe Khoziaistvo SSSR, Gosstatizdat, Moscow, 1960, p. 22: all data are in new prices.

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Voprosy Ekonomiki, No. 11, 196

A. ALEKSEEV AND V. KUVARIN:

Socialism Will Win in Peaceful Economic Competition With Capitalism

The Great October Socialist Revolution opened a new era in the history of mankind, an era of the collapse of capitalism and of the establishment of a new order — communism. Characterizing the significance of the October Revolution, V. I. Lenin wrote: "... We are proud that it is our good fortune to begin the construction of a Soviet state, and thus begin a new epoch in world history, an epoch of the reign of a new class that is oppressed in all capitalist countries and is marching everywhere to a new life, to victory over the bourgeoisie, to the dictatorship of the proletariat, toward liberation of mankind from the yoke of capital, from imperialist wars." (1) Historical development is inevitably leading to the victory of communism in the whole world. "The communists must know," wrote Lenin, "that the future, in any case, belongs to them." (2)

With every year the world historic importance of the October Revolution becomes more and more apparent. Before the Second World War the USSR was the only socialist country. It occupied 17% of the world's territory, had 9% of the world's population, and accounted for approximately one-tenth of the world's industrial output. At present the countries of the world socialist system occupy 26% of the world's territory; their population amounts to more than 33% of the total population of the globe; and these countries produce some 34% of the world's industrial output.

Competition between the world socialist system and the world capitalist system is a characteristic feature of contemporary development. Of decisive importance in determining the course and outcome of the competition between the two systems is the struggle: to develop the productive forces, to strengthen economic might, and to improve the technique and technology of production. Economic competition constitutes the basis for competition between the socialist and capitalist systems in political, ideological and scientific spheres.

The problems of peace and peaceful coexistence are the cardinal issues of our time. In his statement during the general discussion at the 15th Session of the UN General Assembly, Comrade N. S. Khrushchev stated: "The peoples of the Soviet Union and the Soviet Government have been constantly striving to have the relations between state fully established on the principles of peaceful coexistence, to have these principles become the ba sic law of life of the whole of contemporary societ The ideology of the Soviet Union and of all other countries of the socialist camp is directed toward the strengthening of peace and friendship among nations, for the socialist economy needs peace anc not wars. Competition in the development of productive forces and in raising the standard of livin of the broad masses of the people must become th basic principle in the peaceful competition between the socialist and capitalist countries.

The monopolist bourgeoisie, its politicians and ideologists are more and more alarmed by the fact that the peaceful economic competition between the two world social systems is not taking favorable turn for capitalism. In 1959 the Soviet people won new victories in the construction of communism. In his report to the 4th Session of t USSR Supreme Soviet, Comrade N. S. Khrushchev stressed that our Seven-Year Plan had begun wel In 1959 the industrial output of the USSR increase more than 11% instead of 7.7% as set by the plan. The planned increase in production has also been overfulfilled in 1960. In the first 9 months of 196 the volume of industrial production increased 10 compared with the same period in 1959. Comrad N. S. Khrushchev said: "Life has confirmed that the Seven-Year Plan will be fulfilled ahead of schedule and its indices will be considerably surpassed." Today even our most diehard adversari cannot deny the great achievements of the USSR a of the entire socialist camp. They are aware of the fact that the bold economic plans of the social countries are realisitic and represent a serious challenge to capitalism in the world economic co petition between the two systems. They note wit alarm that the achievements of socialism exert a tremendous influence on the minds of millions of people throughout the world. This growing fear was expressed with particular clarity by I.

Deutscher, a British economist, in his book The Great Contest: Russia and the West. He writes hat the prospects of further economic successes by the Soviet Union in conditions of peace "would put a huge question mark over the system of western society" (meaning: over the system based on capitalist exploitation). [retranslated from the Russian — editor.]

What can capitalism show in contrast to the tremendous achievements of the USSR which demonstrate the indisputable superiority of the socialist system? This question was discussed and is being discussed at numerous conferences and meetings in the United States and other Western states. The bourgeois economists and politicians are comparing resources, potentialities and rates of economic growth of the two world social systems. The ideologists of the bourgeoisie would like to present the future of capitalism in rosy colors. To this end they even frequently resort to falsification of reality, inventing various recipes for the "revival" of the capitalist economy. But all these optimistic forecasts and remedies fail when they are confronted with facts and reality. That is why there are such difference of opinions among Western economists. Life itself forces many bourgeois politicians and scientists to come to conclusions which are not at all soothing for capitalism. As an example of this we may cite the collection of reports by prominent American economists entitled Comparisons of the United States and Soviet Economies, published by the Joint Economic Committee of the Congress of the United States. In these reports and in the course of their discussion in various committees of the United States Congress, and in the American press, questions were raised regarding the relationship between the economic potentials, the levels of industrial and agricultural production in the Soviet Union and the United States, their rates of economic growth, dynamics of the living standards of their populations, and the prospects of economic competition between these countries.

The question of the relationship between the economic potentials of the USSR and the United States is constantly attracting the attention of American economists. Thus, Professor G. Warren Nutter of the University of Virginia, in the course of analyzing the economic potentials of the USSR and the United States in his report included in the above collection, holds "that the Soviet Union and the United States have roughly similar resource potentials." It is impossible to agree with this statement. Actually the USSR and the USA possess different resource potentials. Let us turn to the facts.

By the economic potential of a country is meant its economic possibilities, given the fullest possible level of utilization of its productive forces within the existing mode of production. In some of the elements that comprise economic potential (such as the size of population, the size of explored and exploited resources of mineral deposits, etc.) our country is ahead of the United States. The Soviet Union belongs to the group of countries that are best provided with all the important raw materials and fuels. The prospected resources of hard fuel, oil, natural gas and hydropower in the USSR exceed the corresponding resources in the United States. According to existing estimates the hydropower resources (i.e., the potential annual production of electric power when all hydropower resources are utilized) of the Soviet Union amount to 1,200 billion kilowatt hours, and in the Unites States to only 491 billion kilowatt hours.

The Soviet Union occupies first place in the world in explored deposits of iron, manganese, copper, lead, molybdenum, potassium salts, phosphate raw materials and peat. Every year Soviet geologists discover new mineral deposits. The USSR possesses forest resources which are three times as great as those of the United States, and has wider possibilities for extending areas sown under crops.

The production apparatus is another important element of the economic potential., At present the scale of the production apparatus of the USSR still lags behind that of the United States. But to correctly gauge the productive possibilities of each of these countries we must consider a number of other factors, first of all — the extent to which the productive capacities are utilized and their rate of growth. One of the leading American experts, Hans Heymann, writes: "A superior US production capacity does not automatically denote superior US national power... For both countries, it is the effectiveness of the actual performance that counts and this must be measured in the multidimensional framework of a society's will and skill in applying its resources to its national tasks." The American economists also note the rapid growth of the production apparatus of the USSR. Professor Morris Bornstein of the University of Michigan admits: "Comparative growth trends shown for the 1955-1958 period are particularly favorable to the USSR and unfavorable to the United States..." It may be noted here that the tendencies of economic development in the USSR and the USA in 1959 and in the first nine months of 1960 speak no less eloquently in favor of the Soviet Union. Mr. Bornstein also admits that the USSR fully utilizes its available resources, maintains very high and stable rates of growth of capital investments and allows no interruptions in production. The United States does not possess these advantages.

An important element in the economic potential of a country is its labor resources. They are characterized by the size of population, the level of employment of able-bodied persons, their distribution among the branches of the national economy, their cultural and technical level, and their state of health. At present the USSR has a population of more than 214 million people, and the United States — 180 million. Drawing demographic comparisons between the USSR and the United States, American experts note that during the greater part of the postwar period the rates of natural growth of the population in the USSR were higher than in the United States. According to the estimates of the American experts A. Campbell and J. Brackett, the population of the USSR in 1975 will reach 248 to 281 million persons. According to estimates of the Census Bureau of the US Department of Commerce the population of the United States in 1970 will amount to approximately 211 million persons.

It is impossible, however, to draw a full and objective picture of the labor resources of both countries on the basis of these comparisons, because American experts usually keep silent about the fact that socialism provides for a more rational utilization of society's labor resources than capitalism with its anarchy of production, crises, unemployment and other evils of the bourgeois system. It is a commonly known fact that the USSR eliminated unemployment a long time ago. Meanwhile, in the United States unemployment remains at a high level even during periods of high business activity, while during periods of "recessions in business activity," as bourgeois economists mildly put it, the number of unemployed exceeds 5 million persons. Although the population of the USSR is only 19% larger than that of the United States, the number of persons working in the national economy of the USSR is approximately 40% higher than in the United States. This is evidence of the fact that manpower resources are more fully utilized in the Soviet Union. An important part is also played by the fa that in the USSR the distribution of those employe in different branches of the national economy is determined by the requirements of the growth of the socialist economy, while in the United States the relative importance of those in the armed forces, police and the government bureaucratic a paratus is increasing with every year.

Consequently the Soviet "resource potential" i on the whole much higher than the American. Ev if we take the elements of the economic potential in which the USSR is still lagging behind the Unit States (capacity of the production apparatus, pow generating capacity, means of communication, transport, etc.), it has a real possibility of overtaking the United States in a historically brief pe riod of time by using the advantages of the social system.

For the purpose of minimizing the economic strength of the Soviet Union, incorrect data on th relationship between the volumes of industrial ou put in the USSR and the United States are frequen published in the United States. "... Soviet industr output in 1955 may have been, in the aggregate, l than a quarter of the American level..." W. Butl Vice-President of the Chase Manhattan Bank, cit the figure of 20 or 25%. Allen Dulles insists that the industrial output of the USSR amounts to appr imately 40% of American industrial output. Othe figures are quoted too.

Such differences in data are a result of the fac that estimates are made not on the basis of scien tific calculations but as a result of "playing with figures," as one of the authors of the collection c reports in *Comparisons of the United States and Soviet Economies*, H. Heymann, admits. If one wants to make a real study of the data on the rel tionship between the volume of industrial produc tion of the two countries the picture will be quite different:

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Years	Growth of industrial production		USSR volume of industrial production in % of that of the USA
	USSR	USA	
1953	100	100	33
1955	127	106	40
1957	155	110	46
1959	190	115	about 60

Although the gap between the volume of industrial production in the USSR and the United States is still rather large, it is being rapidly reduced with every passing year. The data appearing in the table above cannot claim absolute accuracy. As we know, the relationship between the volume of industrial production in different countries can be determined with sufficient precision only when they are estimated for these countries in accordance with a single methodology, and provided the differences in the structure of their industries are not great. These conditions are absent in the case of comparisons between the volume of industrial production in the USSR and the USA. The two countries use different methodologies in estimating the volume of industrial production. The Soviet Union is not copying the industrial structure of the United States; it is building its own structure, one that is dictated by the requirements of the material and technical basis of communism. Nevertheless even the most careful calculations show that the volume of industrial production in the USSR already amounts to more than half of the volume of industrial production in the United States. Some bourgeois economists, for example, the American Professor Hodgman, the British Professor Nove, researchers at the Munich Institute of Economic Studies and others, have also come to the conclusion that the Soviet level of industrial production is approximately half of that of the United States. Dr. R. Ewell, Vice-President of the University of Buffalo, noted in a speech which Senator Fulbright brought to the attention of the US Congress, that in 1950 the general level of industrial production in the Soviet Union amounted to some 25 to 30% of that of the United States; in 1958 it rose to approximately 50%, and in 1965 it will probably reach 75% of US industrial output. Dr. Ewell noted: "Today the largest steel smelting plants and electric power stations in the world are to be found in the Soviet Union. The Soviet Union has already surpassed the United States in the production of coal, machinery, railway equipment, lumber, iron ore, nickel, tin, manganese, wool, milk, butter and sugar. In the next 3 or 4 years the Soviet Union will surpass the United States in the production of meat, cement, fertilizers and some other basic products." [retranslated from the Russian — editor.]

The table below makes it possible to compare the attained and planned levels of production of a number of important industrial products in the USSR with the level of production of the same items in the United States.

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	Unit of measure	USSR			USA
		1953	1959	1965 (target figures)	
Pig iron	million tons	27.4	43	65-70	55.1
Steel	million tons	38.1	60	86-91	84.8
Coal	million tons	274	436	527-537	389
Oil	million tons	52.8	129.6	230-240	348
Natural gas	billion m^3	8	37.2	150	326
Electric power	billion kwh.	127	249	469-488	795
Cement	million tons	16	38.8	75-81	56.8
Sugar (granulated)	million tons	3.4	6	9.25-10	3.4

A certain post-crisis economic upturn in 1959 in the United States has instilled a hope in some of the American bourgeois economists that the United States will be able to maintain its position in the economic competition with the USSR. However, as already noted in UN materials published in July 1960, the optimistic forecasts for the future that were voiced in the United States at the beginning of 1960 have begun to dim gradually. True enough, in the middle of 1960 there appeared numerous signs of a new economic decline in the United States. Once again the productive capacity of the iron and steel industry was utilized to the extent of only 50%. The general index of industrial production has begun to drop.

A comparison of the levels of agricultural production in the USSR and the USA is no less complex than in the case of industrial production. However, to determine their approximate relationship it is sufficient to compare the volume of production of 20 to 30 major agricultural products comprising up to 90% of total agricultural output, and evaluate them in Soviet or American prices. At present, the Soviet Union is 20 to 25% behind the United States in overall agricultural production, and approximately 30% behind in per capita production. As a result of its great superiority in rates of growth of agricultural production, the USSR — in the near future, even considerably before 1970 — will be able to occupy first place in the world both in ove all and per capita agricultural production.

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Production of Basic Agricultural Products in the USSR and the USA

	Unit of measurement	USSR			USA
		1953	1959	1965 (target figures)	1959
Grain crops including:	million tons	82.5	125.9	164-180	184.9
wheat	million tons	41.3	69.1	—	30.7
corn	million tons	3.7	12.0	—	110.8
Potatoes	million tons	72.6	86.6	147	11
Meat (slaughter weight)	million tons	5.8	8.9	at least 16	17.4
Milk	million tons	36.5	61.7	100-105	56.4
Butter	thousand tons	497	845	about 1,150	653
Eggs	billions	16.1	25.2	37	66.6

The USSR is already ahead of the United States in the production of wheat, sugar beet, potatoes, milk, butter and wool, but is lagging behind the USA in the overall production of grain, meat and eggs. Within the next few years, however, the USSR will surpass the United States in the production of these items as well.

The rates of economic growth are a decisive factor which will determine the final outcome of the competition between socialism and capitalism. It is no accident that comparisons of economic growth rates in the USSR and the USA are at the center of attention of American economists. Back in 1955 experts of the Joint Economic Committee of the Congress of the United States stressed in their report, Trends in Economic Growth: A Comparison of the Western Powers and the Soviet Bloc, that all countries of the world are "closely following the rates of economic growth in the leading countries of the East and West, as well as the methods of achieving such rates." [retranslated from the Russian — editor.] The collection of reports, Comparisons of the United States and Soviet Economies, published by this Committee in 1959, indicates that congressional experts continue to follow these rates with mounting apprehension. And this is not at all surprising: the myth of bourgeois scholars concerning the "inevitability" of a considerable decline in the rates of growth of Soviet production as its overall volume increases, has exploded.

The Soviet economy is growing several times faster than the American economy. In industry — the decisive sector of the economy — Soviet rate of growth surpass those of the United States by n less than five times. Almost all bourgeois exper admit this now. After all, it is impossible not to admit it. Facts provide graphic proof that in the past six years the per capita volume of industria production in the USSR has grown more than 70% while in the United States it has actually remaine at the same level.

In the years of its existence (and it should be noted that almost half of this period was taken u with wars imposed upon the USSR, and on the rehabilitation of its devastated economy) the Soviet Union has made a gigantic stride forward in ove coming its economic lag behind the United States In 1913 the volume of industrial production in ou country was 12.5% of that in the USA. Today it i only 41.2% below the level of the USA. In 1959-1960 alone the production of steel in the Soviet Union rose by 10 million tons, oil — 31 million tons, electric power — 56 billion kwh., while in United States similar production growth was attained only in 12, 9, and 5 years respectively.

Noted American bourgeois economists and

politicians do not conceal their fear for the fate of capitalism. That is why they so persistently call or a rise in the rate of economic growth in the United States. Former US Under-Secretary of State Dillon proposed "that the best American scholars be instructed to find ways and means of promoting US growth, because present rates of growth of the American economy are simply inadequate." [retranslated from the Russian — editor.] A number of bourgeois politicians and economists in the United States (for example, L. Keyserling and G. Colm) demand the adoption of "appropriate measures" in order to raise the average annual rate of growth of industrial production in the United States o 4 or 5%.

Such calls to action are not new. Several years ago an American economist, T. Whitney, urged a rise in the average annual rate of growth of US industrial production to 10%. In his opinion this was he minimum necessary for an economic victory over communism. Past experience has proved, however, that US industry has not even been able to maintain a 3.5% average annual rate of growth, a rate which was predicted by more discreet American economists. In the past seven years, as in the whole postwar period, the average annual rate of growth of US industry was never above 2%.

Some bourgeois economists have begun to understand that the question of production growth rates s organically connected with the very nature of the country's economic system and cannot be solved by means of academic disputes of bourgeois experts, or they are unable — under conditions of capitalism with its inherent lack of planning and anarchy of production — to propose effective measures for accelerating economic growth. We may note here that bourgeois economists, while observing Soviet economic achievements, have more and more frequenty come to admit the ineffectiveness of the capitalst system. As Professor Nutter wrote: "One oreboding economic sympton is the slackening speed t which resource productivity has been growing in American industry. Incentives are being strangled nd nothing is being put in their place to drive the machinery of growth." To the profound disappointment of the advocates of capitalism, the socialist conomy has fully demonstrated its vitality and its remendous advantages. As Professor J. Berliner f Syracuse University noted: "Two generations ago eople debated the question of whether a socialist conomy could possibly work. History removed hat question from the agenda... My discussion takes for granted that the Soviet economy is reasonably fficient..."

Bourgeois economists do not conceal their fear f the rapid rise in the prestige of the socialist countries. In the words of H. Heymann, "rapid Soviet economic progress would exercise fascination and appeal in the vast parts of the world..." Heymann is obviously afraid that people in the capitalist countries are able to make a choice between capitalist and socialist paths of development and may take the socialist path.

As we know, the Soviet Union is successfully solving the task of becoming the state where people will enjoy the highest living standards in the world by 1970. The standard of living represents the degree to which the material and spiritual requirements of the people are satisfied. Its most important elements are the level of consumption of the basic food products and manufactured consumer goods, the availability of housing space, of opportunities to work, rest, education, medical care, etc. Naturally it would be incorrect to draw conclusions on the basis of a mechanical comparison of individual elements comprising the standard of living of the population of the USSR and the USA.

Bourgeois economists in the United States are well aware of the fact that a decisive victory in the economic competition between the two world social systems will be won by the system which, in the final analysis, will provide higher living standards for its people. It is no accident that the Joint Economic Committee of the US Congress is paying such close attention to the analysis of the relationship and dynamics of living standards in the USSR and the USA.

The standard of living depends not only on the development of the productive forces, but also on the character of the social system that exists in a country. In order to compare and define correctly the future prospects of the standard of living in the USSR and the USA — countries with different social systems — we must ascertain the following: the goal of the production of material goods and the means by which this goal is being achieved in the USSR and the USA; the possibilities for the utilization of society's labor resources; how national income is distributed among classes and groups of the society's population; the real wages of workers and employees and the real incomes of peasants and trends in their development; the state's concern for meeting the material and cultural requirements of the broad masses of people.

Comparison of the standard of living of the Soviet and American populations shows that the Soviet Union is in many respects ahead of the United States, the richest and most powerful capitalist country in the world. However, for historical reasons, the American standard of living remains higher than that in the USSR in a number of ways. Experts of the US Congress are "grieved" by the fact that many Soviet citizens do not have their own cars or are living in relatively crowded quarters. It is true that a considerable number of Americans, not having suffered the calamities and destruction of war on their territory, are today better provided with living quarters and many durable goods. But will this situation last long? It is a fact that the scale of housing construction in the USSR, the production of television and radio sets, refrigerators, washing machines and many other goods that help to make life comfortable, is increasing with every year. The system of public catering and household services is being extended and improved. As far as automobiles are concerned, their production, too, will be considerably increased in due time, but they will be used more rationally than in the United States — first of all through car renting services. This will help us to avoid excessive expenditures which are inevitable when automobiles are used individually.

In comparing the standard of living of the Soviet and American people, American economists try to ignore the benefits which Soviet people enjoy free of charge out of public funds. Yet it is a known fact that as a result of the rapid growth of public funds the consumption of Soviet workers is more than one third above the level which their wages alone provide for them. Suffice it to say that in 1959 alone the expenditures of the Soviet state on social insurance, pensions, stipends, free education, medical care and other types of public services increased by 15 billion rubles. American working people do not even know about the numerous benefits enjoyed by working people under socialism, such as free medical care, free higher and secondary education, low rent that amounts to only 4 or 5% of their wages, reduction and even full abolition of taxes. A worker in the United States pays an average of 20 to 25% of his wages for rent. Taxes, as a rule, take one-fourth of his earnings. Expenses for medical treatment are so high that according to some estimates only 20% of the US population are able to take regular care of their health. As a result of the inadequate scale of housing construction in the United States the number of dilapidated and condemned buildings is increasing every year. No less than 17 million Americans live in slums. If, in addition, we recall the tragedy of millions of unemployed and their families it will become obvious that "average statistics" screen a very unattractive "way of life" under which no less than one-fourth of the population is forced to live in misery and poverty. In spite of all this, the ideologists of American capitalism, like R. Ewell for instance, ask the people of the United States to "tighten their belts" in order to meet the "Russian economic offensive."

The rapid growth of the people's well-being in t Soviet Union is forcing the experts of the Joint Ec nomic Committee of the US Congress to revise their views. In was arbitrarily alleged in the Co mittee's 1957 report that the Soviet Union cannot compete with the United States in the standard of living of their people. The collection of reports published in 1959 includes the view that soon afte 1965 "the Soviets will approach our standard of l ing." [retranslated from the Russian — editor.] In this connection it is curious that one of the co tributors to this collection of reports states that "the Russians, possibly, will be able to attain sor similarity to our way of life." [retranslated fro the Russian — editor.] But the "American way o life" does not suit the Soviet people. In building communism they are asserting their own, more humane and just, mode of life.

The 21st Congress of the CPSU emphasized tha the full and complete victory of socialism has be attained in the USSR and that we have entered a n period of development, the period of full-scale co struction of a communist society. Establishing t material and technical basis of communism, surpassing the level of per capita industrial producti in the most developed capitalist countries, achiev a higher productivity of social labor than that un capitalism, and on this basis providing for the hi est material and cultural standard of living in the world — these are the most important tasks of th period. In 1913 the per capita industrial output o our country was 7 or 8% of the United States leve in 1937 — 15%, in 1956 — 39%, in 1957 — 42% an 1959 it was already 45%. The time is not far off when the Soviet Union, by using the great advantages of socialism, will occupy first place in the world in per capita industrial production. As a r sult of the fulfillment of the Seven-Year Plan the Soviet Union will occupy first place in Europe in per capita industrial output, and in 1970 or even earlier the USSR will leave the United States behind.

With every year the forecasts of American bou geois economists and politicians about the future course of economic competition between the two systems are becoming less and less optimistic. Sham optimism is replaced by badly concealed f for the fate of the capitalist system. Today the ideologists of the bourgeoisie evaluate facts mor sensibly than several years ago. Back in 1955 t Joint Economic Committee asserted in its repor Trends in Economic Growth: A Comparison of t Western Powers and the Soviet Bloc, that in 19 the gap between the levels of output in the USSR and the USA would not only be reduced but would crease. In its reports, Soviet Economic Growth

Comparison with the United States, published in 957, it was already admitted that the USSR was reucing year by year the gap separating it from the nited States in per capita industrial production. owever, the authors of the report predicted that ne Soviet Union would allegedly lag behind the nited States for an indefinitely long period to come. n the collection of reports published by the Commitee in 1959 the following was already admitted: "The aintenance for an extended period of time of high ates of growth of industrial production has added onviction to the statements of the Soviet Union rearding its intention of surpassing, in the shortest ossible time, the United States level of industrial roduction." [retranslated from the Russian — ditor.] There is nothing left for the American ourgeois economists today but to discuss the conrete period of time which our country will require n order to surpass America economically. In most ases they have come to the conclusion that the oviet Union will need from 10 to 20 years to achieve his.

Only recently bourgeois economists asserted that apitalism and not socialism provides the best posible opportunities for the development of the econmy, science, technology and culture. The Joint conomic Committee declared in its report pubished in 1957 that the American economy was the ost advanced, the most productive and the most lexible in the world. Today, under the influence of he tremendous achievements of the USSR in all ields of economic and cultural development, boureois economists have had to revise their positions. s Nutter wrote: "We in the United States have beome accustomed to having our economic system iewed, for good cause, as the most effective generaor of industrial growth of all time. We should now recognize that the Soviet system has so far proved itself to be more or less our peer in this narrow respect." In a report prepared for the Joint Economic Committee by Vice-President of the AFL-CIO Walter Reuther, and recently published in the United States, data on the colossal waste of the capitalist social system were cited. Reuther wrote that in the period from 1953 to 1958 it would have been possible to produce an additional 200 billion dollars worth of goods if there had been full employment and complete utilization of the production apparatus of the United States. He admits that rate of economic growth in the United States gives rise to apprehensions not only in comparison to the economic achievements of the USSR, but also in appraising "the prospects of struggle for human minds, hearts and devotion." [retranslated from the Russian — editor.]

Advocates of capitalism are obviously worried about the fate of the weakening capitalist system that has discredited itself in the eyes of the peoples of the world.

The great advantages of socialism are a reliable guarantee of an early victory for the Soviet Union in the peaceful economic competition with the United States. The future does not belong to the capitalist system which is nearing its end. The future belongs to communism.

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Footnotes

(1) V. I. Lenin, Collected Works, Vol. 33, pp. 32-33 (Russian edition).

(2) Ibid., Vol. 31, p. 81.

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PROBLEMS OF SUPPLY AND DEMAND

Voprosy Ekonomiki, No. 11, 19

K. SKOVORODA:

Supply and Demand for Goods in a Socialist Society

One of the fundamental tasks confronting our country in the period of the full-scale building of communism is that of more fully meeting the growing material and spiritual requirements of the Soviet people. Soviet trade, which must satisfy the people's requirements for mass consumption goods, will play an important role in bringing this about.

The rapid increase in industrial and agricultural production has made it possible in recent years to meet the needs of the population more fully. In 1959 alone, sales of the principal consumer goods through the state and cooperative trading network increased as follows: meat and meat products — 20%, milk and dairy products — 18%, sugar — 10%. The population's purchases of cotton fabrics went up 7%, clothing and underwear — 10%, knitted goods — 13%, furniture — 28%, clocks and watches — 18%, and television sets — 21%.

The successes recorded in Soviet economic development make it possible in the very near future to solve the problem of creating an abundance of material and cultural values and to provide the conditions which will enable the Soviet people to fully enjoy all these benefits. A decisive effort to meet this problem is being made in the course of fulfilling the Seven-Year Plan of national economic development. Between 1959 and 1965 retail sales of foodstuffs will increase by 57% and of manufactured goods by 69%. The increase will be particularly marked in a number of vital food products, which will assure a much better diet for the population. For instance, sales of meat products, dairy products and eggs will more than double; sales of fruit will rise by 230%. This will mean that meat consumption per capita will rise from 38 kg. to 68 kg., milk and dairy products — from 248 kg. to 392 kg. Production of sugar per capita will amount to 41-44 kg. compared to the present 26 kg., which will fully meet requirements in both town and countryside. Sales of vegetable oils, potatoes, vegetables, tea and herring are being planned in magnitudes required to ensure rational norms of consumption.

The solution of these problems in a relatively short historical period is possible only in a socialist society where production is aimed at satisfying th needs of society. Therein lies the tremendous ad vantage of a planned socialist economy, an economy which is able to produce a variety of product in accord with constantly growing requirements. Engels wrote that the new social order which will replace the capitalist system "by means of the planned organization of the whole of production wi increase the productive forces of society and the products they produce to such a magnitude that ea person will be assured the satisfaction of his reasonable wants in increasing amounts." (1)

In order to make the most rational use of ever thing that nature and labor can yield, to assure th development of production according to requirements, we must learn how to measure requireme and to observe their changes.

One of the most important practical aspects of working out national economic development plans is the study and determination of requirements fo means of production and articles of consumption in the socialist planned economy.

The requirements for means of production can be determined by direct calculation for most type of output. For example, the metal required for t manufacture of equipment can be determined on t basis of the quantity of standard equipment produced according to types and norms of expenditu of metal involved in their production, etc. The d ficulty of determining requirements for means o production arising from the possibility of replac given types of products by others can be met by studying the possibility of using new types of ma rials, such as plastics instead of metal, and the difficulties connected with the complexity of calc lating requirements — by technical and economic computations.

Matters are different when it comes to studyin and determining society's requirements for mas consumption goods. Here the chief consumer is the population. The only exceptions are the products which are designed for export or for industrial processing. The study and determination o the population's requirements for mass consump goods involves serious difficulties, for these requirements are highly mobile and, under the impact of the development of production and improved living standards, undergo constant change.

An inaccurate assessment of requirements for certain kinds of industrial and agricultural produce may lead to a situation in which the demand of the population, as well as the needs of industry and exports, will not be fully met. Indeed, if the volume of production of consumer goods is known, and requirements for individual products have not been studied or determined, the two can conform only temporarily and accidentally. It follows that any possible disproportions between production and consumption can be avoided only if we know, above all, what the requirements are and how they are changing. Given these conditions, the plan can provide for appropriate rates and volumes of production of individual products sufficient to meet requirements.

As we move closer to communism a study of the requirements of the Soviet people, of their needs, will assume increasing significance in national economic planning for the purpose of increasing production to a level which will ensure an abundance of consumer goods in the country. Indeed, abundance is unthinkable in isolation from reasonable requirements, for abundance in practice signifies the unlimited satisfaction of requirements. But general abundance will be achieved through the abundance of particular products and not at one fell swoop for all consumer goods. This arises out of the fact that the volume of production and the conditions for increasing the output of given products are different. It is possible, for example, to achieve an abundance of butter, vegetable oils and sugar sooner than an abundance of meat products. Nor are the saturation points at which needs are fully met the same for all goods. The limits to the demand for food are much narrower than for industrial (non-food) items. It may therefore be assumed that abundance will be achieved first in food products, and only later in other commodities.

It follows, therefore, that production should be developed with an eye to requirements for specific commodities within the country and also for shipment abroad. In practice this means that it would be irrational to produce, for example, more than 40 to 50 kg. of sugar per capita, for in that event social requirements would be exceeded and part of the labor would be expended irrationally.

Speaking at the 9th All-German Workers' Conference in Leipzig in March 1959, Comrade N. S. Khrushchev said: "I do not think that the problem of providing people with the means of subsistence will even arise under communism. The important thing will be to utilize in the best and most rational way everything that nature and labor can bestow on people in the interests of all humanity, which will have achieved communism, and not only in the interests of one nation."

Under socialism the bulk of consumer goods assume the form of commodities, and the population's requirements are met through the expansion of state and cooperative trade. Under conditions of commodity circulation the population's requirements (except those satisfied outside the market) are expressed through effective demand and are determined on the basis of its analysis. When the effective demand is known it is possible to coordinate the magnitude of this demand with the volume of production of different commodities and, whenever necessary, to provide for higher rates of production for goods the demand for which has not been fully met. For instance, gross output in the light industry is to increase by 50% between 1959 and 1965, while the production of fabrics — for which there is a greater demand — will rise as follows: combed cloth — 250%, mixed cloth — 80%. Much will be done in the way of increasing production of fine quality staple fibers, as well as furniture, cultural goods, household machines and other items which are not being supplied in insufficient quantities to meet demand.

The coordination of the whole mass of commodity produce with effective demand is assured by the use of such an important instrument of planning as the balance of incomes and expenditures of the Soviet population as a whole and for individual republics. Such balances make it possible to determine total effective demand in the country and in given republics, and therefore the requirements for the whole mass of commodities. The necessary volume of retail trade in the state and cooperative network is also determined on the basis of the magnitude of the purchasing power fund. Beginning with 1959 the balance of incomes and expenditures of the population have been calculated for each Union Republic. This has placed the commodity circulation plans for the country as a whole and for each Union Republic on a sounder basis. In this way, by using the planned character of the socialist economy the state maintains a definite balance between supply and demand, and by increasing production and the money incomes of the population creates the conditions which ensure a rapid growth of commodity circulation and realization of established plans.

The growth of personal and industrial consumption ensures a continually increasing demand for the produce of the light, food and heavy industries. Increased production under socialism also signifies increased consumption, for the purpose of production in a socialist society is to satisfy requirements: the greater the production of goods for society, the greater the consumption. However, this does not mean that under socialism every commodity which is produced by industry will find a buyer. Some articles, even when supplies are short, may remain unsold for reasons of poor quality, inappropriate assortment, the improper establishment of prices, and will lie stacked in warehouses, marketing organizations and shops. True, instances of this kind do not stem from the nature of the economy in a socialist society, but they may arise as a result of shortcomings in planning the production of some goods.

Problems of the relationship between the supply and demand for consumer goods at the present stage of development are attracting increasing attention. This is a practical necessity. Until quite recently, as long as the increase in production of consumer goods did not keep pace with effective demand, the main task was that of achieving a balance between commodity stocks and effective demand by increasing the production of all kinds of goods. Now this problem has become far more complicated because of significant economic changes in trade, changes which stem chiefly from a considerable increase in the mass of commodities and the growing material well-being of the population. Today the question of coordinating supply and demand, not only as a whole but also for individual items — since only in this way will it be possible to assure continuity of sales of consumer goods and the satisfaction of the various requirements of the population — has become a practical issue. The difficulty of coordinating supply and demand for individual goods stems from the fact that it is impossible to determine the effective demand for individual goods by simple calculations. Here we are confronted with a vast number of buyers with different needs, requirements, tastes and incomes. However, in a socialist economy it is necessary and quite possible to study the laws of change of consumer demand and use them effectively in planning national economic development. This requires a systematic study of consumer demand and the conditions which make for changes in it. Without a well organized study of consumer demand it is impossible to coordinate the supply and demand for individual items properly. It is important to study and determine consumer demand not only quantitatively; it is also essential to take into account requirements with respect to quality, variety, style, size, type as well as other factors characterizing the use value of the product. An analysis of consumer demand must answer the question of how much of the great variety of goods should be produced in order to fully meet demand.

Unfortunately, inadequate attention is being give in economic literature to investigating the proble of the conformity of demand and supply. Journal articles as a rule do little more than examine the question of balancing cash incomes and the mass commodities designed for retail sale, and do not analyze the most difficult aspect of the problem — the balancing of supply and demand for separate items. But the important problem at present is that of coordinating supply and demand for individual goods, for only then will the satisfaction of requirements within the framework of a general balance of supply and demand be complete. Indee in 1959 for example, total commodity stocks were sufficient to fulfill the commodity circulation plan but it was not fulfilled. This happened because th planning bodies, trading organizations and industrial enterprises are doing little to study the dire tions in which demand is developing, to thoroughly analyze the factors influencing changes in demand as a whole and in its structure. Meanwhile, the nature of consumer demand has changed substantially of late. The population increasingly expects higher quality and improved assortment; buyers are becoming more and more particular. New brands and models are finding a readier sale than old fashions and models, sales of which have dropped markedly. All this calls for better organization and the elimination of shortcomings. But the trading organizations are reorganizing too slo ly, at times misjudging consumer demand and not exercising the necessary influence on industrial enterprises so that they will produce the goods buyers want. The shortcomings in studying consumer demand lead to mistakes in determining th quantity of goods required for sale to the population. At times trading organizations place orders with industry asking for goods which do not conform to the actual requirements of the population.

What these shortcomings in the study of consumer demand and its prospects can lead to may be seen from the following example. Three years ago there were enough woolen blankets, electric irons and meat grinders for sale. Surplus stocks even began to accumulate in the shops. In some towns and districts trading organizations began to refuse some of the goods which industry was producing. The production of these goods was curtailed, but on a greater scale than market conditions required. The production of woolen blanket for example, fell from 8,319,000 meters in 1955 8,066,000 meters in 1958, electric irons — from 5,291,000 to 2,143,000 respectively. Following th curtailment, accumulated stocks were sold and in 1959 there appeared a shortage of woolen blanket electric irons, meat grinders and certain other goods. The following table shows how market stocks of electric irons and meat grinders changed from 1950 to 1959 (in thousands):

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	1950	1953	1955	1956	1957	1958	1959
Electric irons	417	1,742	4,898	1,830	1,650	2,125	3,686
Meat grinders	1,470	1,420	1,165	1,123	1,370	1,950	2,836

In the last few years the same situation occurred in some other goods. Trading organizations, for example, were asking for a reduction in the output of bicycles, clocks, watches, radios and cameras, although consumer requirements for these goods are not yet fully satisfied. The output of these goods can be continued at present levels and can even be expanded provided that new models are produced, that quality is improved and prices are reduced. Measures have been taken lately to increase the production of electric irons, meat grinders and other goods which are in short supply, to a level which will satisfy consumer demand. Improved planning and a better study of consumer requirements and demand will make it possible to maintain production at a level which will fully meet the population's needs.

Changes in sales of mass consumption goods and in the demand were particularly evident in 1959. While in previous years bread sales increased annually by 4 to 6%, in 1959 they increased only 2% in view of the greater demand for non-food commodities, and sales of macaroni items, lard and certain other products even declined. At the beginning of 1960 the situation in consumer goods' trade improved markedly; the shortage list is now noticeably shrinking and an ever increasing number of goods are among those which are in adequate supply. Agriculture and industry are now meeting consumer demand for bread items, macaroni produce, rice, confectionery, herring, tinned fish, vegetable oil and margarine products. The demand for woolen, staple and silk fabrics, ready-made clothing, footwear and a number of other goods is also being fully satisfied. The important thing now is to maintain the existing balance between supply and demand for these goods. Any further increases in the production of these goods must go hand in hand with improved quality. There is increased consumer demand for cotton and woolen fabrics (except for certain items), knitted goods, synthetic furs, furniture, building materials, electrical equipment, electric bulbs, refrigerators, television sets, pianos, washing machines, automobiles and many other goods. Market stocks of some of these goods are still inadequate to fully meet the demand and the task is to step up the production of these goods.

Industrial enterprises do not always taken into account the shifts in trade and in demand; they continue to produce goods which are no longer in demand and are very slow in switching to new fashions and models. Some goods are produced in sufficient general quantity, but in variety and specifications the demand is not satisfied because the assortment does not correspond to the population's requirements and the quality is sometimes poor. This applies to some types of woolen goods, ready-made clothing, confectionery items, leather and rubber footwear, and other goods.

The changes in trade are not only evident in the more complete satisfaction of consumer demand, but also in the growth of commodity stocks in the retail and wholesale network. This growth, arising out of a greater volume of production and a better assortment of commodities, is necessary to satisfy the growing needs of the population. The essential thing is to see to it that the goods are of high quality. However, as the changes in trade and consumer demand are not always considered on time by trade organizations and industrial enterprises, commodity stocks sometimes increase as a result of the accumulation of out-of-date items, sometimes of poor quality, for which the demand is inadequate. In the case of some items the stocks have outgrown normal requirements and result from deliveries made without considering consumer demand.

In order to satisfy the population's requirements more fully the Party Central Committee and the USSR Council of Ministers have taken measures designed to further develop the textile industry, to increase the production and improve the quality of cultural and household goods in the next two years. In the textile industry the assortment and the quality of goods for which there is a substantial demand will be improved. Everything is being done to encourage production of new kinds of fabrics, satisfying in color and design; output of textiles prepared from a variety of mixtures of natural and chemical fibers is increasing. Conditions are being created, states the decision of the July (1960) Plenary Meeting of the Party Central Committee, for a more rapid increase in the production of fabrics, knitted goods and ready-made clothing, footwear, foodstuffs and other goods in order to fulfill the task of fully meeting the growing requirements of the population earlier than previously planned. For this purpose from 25 to 30 billion rubles are being invested in the development of the textile and footwear industries, their raw material supplies and machine-building facilities. This sum is being appropriated out of supplementary accumulations in excess of what has been provided by the target figures.

In connection with the increased production of consumer goods and the fact that the trading network is receiving ever greater supplies, it is particularly important that we improve the study of effective demand so that the volume of production, the assortment and quality of goods fully correspond to consumer demand. The latter must be studied systematically, for with the rapid growth and improvement of production, with the steadily rising well-being of the people, new requirements arise, old ones change, and people become more exacting with respect to the quality and assortment of goods. A large variety of completely new items appear on sale which people soon become accustomed to and the demand for which grows steadily. This is evident in the case of fabrics and clothing produced from synthetic fibers, radio goods, television sets, washing machines, motor scooters, refrigerators, vacuum cleaners, electric floor-polishers and other goods.

With the appearance of new requirements and the increasing demand for new items, the demand for some of the old wares naturally declines. These constant changes in requirements and demand, which are the form in which requirements are manifested, make the systematic study of the structure and growth of requirements a particularly complex and responsible task. In connection with the job of working out scientifically substantiated norms of consumption the latter must now be used as a basis for determining the volume of production of the major food items (such as bread, meat and dairy products, sugar, fats, fish products, potatoes, vegetables) in amounts corresponding to the purchasing power of the population. By utilizing the consumption norms it will be possible to determine the physiological requirements for individual goods. Of course, physiological requirements do not determine the demand, but they are an important criterion for establishing the volume of production of different commodities in drafting the plan. It should also b borne in mind that increased production and improved material well-being brings the consumptio of food products closer to the scientifically established norms, and non-foodstuffs to the rational consumption norms, thereby increasing the possibility of using them to determine not only future but also current requirements.

The task is to continue the work of evolving mo accurate norms of nutrition and average rational norms of consumption of textiles, knitted goods an footwear, and carefully substantiating them in order that they may be used in planning the produc tion and consumption of these goods. We must als draw up norms for a whole group of other consumer goods, including household and cultural items. This can be done by the planning agencies in conjunction with the scientific research institut and the institutes of trade and public catering of th Ministries of Trade of the Russian Federation an the Ukraine.

A particularly important part should be played consumption norms for individual republics and economic regions. In calculating requirements fo consumer goods in the republics the average all-Union per capita consumption norms cannot be appli for this would leave out of account the specific fea tures of consumer requirements in the given repu lic. In determining average consumption norms f the various regions it is essential, in the first pla to take into account the prevailing level of consum tion and income of the population, the proportions of the urban and rural population and their occupa tional composition, and in the second place — var ous economic and natural phenomena, historical and national characteristics and traditions. In the southern regions people require less meat, fats, warm clothing and footwear than in the northern areas where requirements for these products and goods are greater in view of the lower temperatures there. Nor can we ignore the existing level of consumption and its peculiarities. In the Mold vian, Georgian, Azerbaijan and Armenian Republics more bread is consumed than in the Belorussian, Lithuanian, Kazakh and Latvian Republics. However, people in Belorussia and Lithuania eat far more potatoes than do people in other republics, and vice versa — in the Central Asian and Transcaucasian Republics potato consumption is well below that in the Russian Federation, Belor sia and the Baltic Republics. This is due not onl to the restricted production of potatoes in the southern regions but to the greater volume of pro duction and consumption of vegetables, above all, of tomatoes. The latter structure of food consum tion is more rational than the one in which the share of potatoes is high, and this should be considered in organizing shipments of potatoes to the southern areas.

It should also be noted that in calculating the required volume of production for a number of goods we can use such indices as expenditure of products per family (for instance, one refrigerator or radio set per family). The volume of requirements established in this manner, when compared with the existing consumption level, will make it possible to assess properly the extent to which the population's requirements are being met and — if only approximately — to define the actual volume of requirements as such. The characteristics of consumption worked out on the basis of norms of consumption for individual goods should be supplemented and reinforced by an analysis of trends in the development of production and the population's purchasing power, and also by data obtained from the systematic study of consumer demand.

Production plays the decisive role in the formation of demand. The development of the production of margarine products, for example, affected the volume of consumption and the demand for butter, lard and vegetable oil. The development of the production of milk powder and tinned milk spread consumption of dairy products to places where there are no dairy farms and thereby not only increased the consumption of these products but also changed its territorial structure.

A shortage of some products and a surplus of others, as well as the possibility of substituting certain products for others, affects not only the volume of consumption but also changes the demand. For instance, when the supply of vegetable oils is inadequate there is a greater demand for animal fats, when the supply of cereals is inadequate the demand for macaroni products and potatoes increases. Of paramount importance in determining the demand for particular products is an assessment of the purchasing power of the various groups of the population (workers, employees and peasants). The socialist economic system makes it possible to plan the incomes of the population — the decisive factor in the formation of demand — and when the incomes of the population, their distribution among particular groups, as well as the relative stability of retail prices are known, it is possible to make firmly based assumptions concerning the demand for consumer goods. In studying the demand for consumer goods it is essential to consider both the volume and structure of consumption. These may vary in accordance with the incomes of different groups of the population. Data from budget studies show that among families of workers with an income of up to 6,000 rubles per member of the family a year, 66% of all expenditures for goods are used for the purchase of food, and when the income per member of the family is over 9,000 rubles — 54.5% is spent on food. Consequently, the higher the income the smaller is the share spent on food, and the greater is the share spent on non-food items.

As their material well-being improves the consumption of the Soviet people also changes. When abundance is achieved the demand for basic foodstuffs will grow at a slower rate than the demand for manufactured goods. Among non-food items the share of durable and cultural goods is increasing. Thus, while retail state and cooperative trade increased 190% between 1940 and 1959, food sales rose 140% and sales of manufactured goods increased 290%. As a result, the share of foodstuffs in the overall volume of commodity circulation of state and cooperative trade in 1959 dropped to 54% compared to 63.1% in 1940, and the share of industrial goods increased to 46% compared to 36.9% in 1940.

In the case of food consumption the share of the more valuable meat and dairy products is growing more rapidly, and in non-foodstuffs — the share of new products and durable goods. This is obvious from the following: workers' families with an income of up to 9,000 rubles a year per member spend 13% of their total food expenditures on bread and bread products, and 16% on meat and meat products; for those with an average income ranging from 9,000 to 12,000 rubles the respective figures are 11 and 18%. This is also true of manufactured goods where, with growing incomes, expenditures for cultural and other durable goods are increasing. These trends will continue with the growing material well-being of the people. According to calculations, the share of non-food items in commodity circulation will reach 48-49% by 1965; simultaneously there will be an absolute increase in the commodity circulation of food products.

The results of the fulfillment of the commodity circulation plan in the first half of 1960 confirm the fact that significant qualitative changes have taken place in consumption in recent years. Retail state and cooperative trade in the first six months of 1960 increased 9% in comparable prices compared to the first half of the previous year; sales of meat and meat products increased 20%, milk and dairy products — 13%, and sugar — 10%. During the same period the sale of woolen fabrics increased 12%, clothing and underwear — 10%, knitted goods — 11%, furniture — 20%, refrigerators — 18%, washing machines — 39%, and TV sets — 29%.

In the last few years the Party and government have done much to raise incomes in both town and country. This, of course, could not help but affect consumer demand. One of the chief ways of raising real incomes is to reduce the prices of particular goods. In the course of 1959 and the first half of 1960 retail prices have been reduced to the extent of more than 11 million rubles (calculated on an annual basis). Prices have been cut for silk fabrics, animal fats, cameras, clocks and watches, bicycles, haberdashery items and others.

Apart from the foregoing, the demand for some types of products marketed through the state and cooperative network is significantly influenced by the volume of these products sold on the collective farm markets and by the amount produced and consumed from subsidiary farm plots. Although collective farm trade accounted for only about 6% of total commodity circulation in the country in 1959, in some items (potatoes, vegetables, milk, eggs) sales on the collective farm markets are still considerable and must not be ignored in studying consumer demand. Furthermore, the receipts from collective farm market sales are spent chiefly on manufactured goods, thus increasing the demand for these goods. Many other factors influence consumer demand to one degree or another, including price ratios among certain goods, the occupational and national composition of the population, its cultural level, climate, fashion changes, etc. The increased demand for furniture, for example, stems from the tremendous expansion of housing construction.

An important element in coordinating the supply and demand for some goods is the utilization of the sales data of trade organizations. If the demand for certain goods is satisfied the actual sales data also characterize the magnitude of the effective demand for these goods. Of course, the pattern of demand in the planned period changes under the influence of higher living standards and other factors. However, some idea of the character of the structural adjustments in demand stemming from the increased well-being of the population can be derived from an analysis of the budget studies of various groups of the population.

Whenever the demand is not fully satisfied, the determination of its actual level requires the use of operating data of trade organizations on shortages of stocks in the stores, the data of supply organizations characterizing the selection of stocks, and the materials of sample statistical surveys. To do this it is necessary first of all to collect and classify materials characterizing demand, particularly data available at stores on the goods for which demand exceeds supply, the approximate extent of shortages of given commodities, etc. Proper organization of this work will help to solve the most complicated task, that of determining the necessary volume of production of the whole variety of goods and of using this as a basis for planning production.

There are times when, for one reason or anothe disproportions arise between the supply and demand for particular goods in the course of fulfillin the plan. If the discrepancy is insignificant the di proportion is eliminated by bringing in reserve stocks available in the retail and wholesale networ or by an improved distribution of commodities among the districts. In such a case retail and wholesale stocks may temporarily decline to a minimum. This was the case, for instance, early in 1960 for cotton fabrics, knitted goods, furniture building materials and certain other goods, stocks of which had diminished two or three years before and had not yet reached established norms. If the shifting of stocks fails to restore an equilibrium between demand and supply, this disproportion, de pending on the reasons which gave rise to it, is eliminated either by expanding production and con modity circulation — if resources are adequate — or by increasing the real incomes of the populatio by reducing retail prices — if production is growing more rapidly than the incomes of the population.

One significant factor which influences effective demand for given commodities is the price of the article. The consumer spends his income freely, taking note of everything that might influence his choice, that is, he compares goods with respect to both their utility and price. Hence, the price leve of various goods has a direct bearing on demand. The impact of the price factor has increased now that production has attained a level which permits the demand for many goods to be satisfied. When supplies are short, people sometimes have to buy things regardless of price and inferior quality. B now this is no longer the case for most goods. T or three years ago, for example, when there was shortage of sugar, jam was freely sold for ten or twelve rubles a kilogram. However, when supplie increased and more sugar was sold, jam sales dropped and prices had to be cut.

Prices may encourage the demand for some goods and, on the contrary, may also restrict it. Prices of vodka and other alcoholic beverages, fo example, have been established with a view to restricting the consumption of alcohol; prices of clothing are more advantageous to the consumer than prices of fabrics; prices of baked bread are more favorable than prices of flour. Thus, retail prices and price relationships among given commodities make it possible to form and, in some measure, to restrict or encourage the demand fo particular goods.

An analysis of the data on changes in inventorie is also important for studying demand. Such an analysis helps us to ascertain the goods which are not in demand and are being accumulated in the trade network, and also to determine when there is an increased demand for certain kinds and assortments of goods.

In order to satisfy more fully consumer demand for a large variety of goods, the July (1960) Plenary Meeting of the Party Central Committee instructed all leaders of industrial enterprises, economic councils, planning and trading bodies, to carefully and thoroughly study the demand for mass consumption goods, quickly reorganize production for the manufacture of high quality and attractive fabrics, clothing, footwear and knitted goods, additional up-to-date cultural and household goods, and promptly cease the production of goods which people are not buying. A practical implementation of the Plenum decisions on improving the material well-being of the people was the decision adopted by the Party Central Committee and the USSR Council of Ministers in August 1960, "On Measures for the Further Improvement of Trade."

To make sure that the variety of goods meets the population's needs, consumer goods production plans for industrial enterprises should be approved on the basis of orders placed by trade organizations and their delivery contracts with industrial enterprises. Trade organizations must be made more responsible for the orders they place so that these may really reflect consumer demand and requirements, including deliveries to other areas and for use to meet overall national needs. Consumer goods production plans for industrial enterprises will be subject to approval by the economic councils in specified assortments which will guarantee fulfillment of the orders placed by trade organizations. With the same object in view, consumer goods production plans drafted by the USSR State Planning Committee and the Union Republics will, beginning with 1961, be determined for groups of major commodities. The annual national economic development plans will also stipulate concrete measures for liquidating shortages of particular goods as well as assignments for developing new varieties. However, the question of stopping production of particular goods must be agreed upon with the respective trade organizations. This will ensure the output of those goods which are in demand, thereby satisfying requirements more fully. Consumer demand and its fuller satisfaction are the factors which will now determine the production of a given item.

An important measure designed to satisfy consumer demand more fully is that of increasing stocks of goods in the retail network and at public catering establishments, thereby broadening the assortment of goods and providing a better choice of items. Trade organizations must systematically renew their assortment, selling the items in good time so that fashions and models do not become outmoded.

A great variety and a large quantity of goods do not necessarily mean that consumer demand will be fully satisfied. This also requires a sufficient number of stores, shops, bases, warehouses and refrigerators so that goods may be readily made available to the consumer. Therefore, the adopted decision provides for the construction, between 1961 and 1965, of 105,000 shops, that is, 50% more than in the preceding five years, and an increase in the number of employees by 40%, or by a total of 330,000. The state trading network will increase by 130% and the network of catering establishments by 120%. In the big cities shopping centers will be built with a variety of shops, catering establishments and service facilities. When this program is carried out trade will improve substantially and much better services will be provided for the population.

The network of special shops selling manufactured goods, especially commodities with an extensive assortment, as well as self-service shops, will be increased. The expansion of the self-service network is being held up because insufficient quantities of packaged goods are being produced. Hence, measures must be taken to increase their output within the next few years. The small-trade network which does not require large capital investments — pavilions, stalls, booths, house-shops, delivery sales (especially in the countryside) — will also ensure better service. Measures are being taken to increase storage space by 51% between 1961 to 1965. The plans provide for the construction of warehouses with a floor space of 9,000,000 square meters and vegetable storage facilities with a capacity of 3,500,000 tons. The storage capacity of state trade will almost double and will reach a level assuring the storage of ever-increasing stocks of potatoes, vegetables and other products.

Important steps will be taken to supply trade establishments with a variety of equipment and devices. The production of technological equipment for trade establishments by 1965 will rise to 2.5 billion rubles per annum compared to an average of 1.4 billion rubles during 1952-1958. This will help to equip shops and dining halls with modern equipment and extensively develop new forms of trade. Fabrics and tailored goods will be sold according to models, ready-made clothing will be altered to fit buyers, and fashion houses will be set

(CONTINUED ON PAGE 65)

FUEL AND POWER PRODUCTION

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L. SMYSHLIAEVA:

The Development of the Gas Industry and the Use of Gas in the USSR

The fundamental changes to be introduced into the structure of the fuel balance by means of raising the share of the most economical kinds of fuel, as envisioned by the 21st Party Congress, assume a rapid growth in the extraction and production of gas. The resolution adopted in August 1958 by the Party Central Committee and the USSR Council of Ministers, "On the Further Development of the Gas Industry and Gas Supply to the Enterprises and Towns of the USSR," provides for raising the output of gas to 270-320 billion cubic meters in the coming 15 years. This will be 9 to 11 times more than had been produced in 1958. By the end of the current seven-year period gas output will reach 150 billion cubic meters.

The July 1960 Plenary Session of the Party Central Committee stressed that the successful functioning of heavy industry was a most important condition for the pre-schedule fulfillment of the Seven-Year Plan in all branches of the national economy. The further development of industry and transport at rates that are higher than those provided for by the Seven-Year Plan requires, first and foremost, that the assignments on the output of major items of heavy industry should be carried out ahead of the schedule fixed by the target figures. Gas is one of the items in this group cited in the Plenary Session resolution.

The tasks set by the Communist Party and Soviet Government for the development of the gas industry require the solution of a number of major economic problems. They involve the ensuring of the planned volume of gas output, providing gas supply to consumers with due consideration for the irregularity of consumption over time, and the choice of the most suitable uses for this efficient type of fuel.

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A sharp increase in gas prospecting is an important condition for increasing natural gas output. Practically no independent exploration for gas deposits was conducted until recently, gas prospecting being carried out only incidentally in connection with prospecting for oil. In the course of the fifth Five-Year Plan only 1.2 million meters were drilled for gas, which was 10% of the total drilling in oil prospecting. The 1959-1965 prospecting volume includes the drilling of 15 million meters of deep prospecting holes for gas.

Important changes have taken place in the balanc of prospected gas resources of the USSR in the pos war years: the rate at which reserves are being replenished is much higher than the rate of gas ou put. In the course of the fifth Five-Year Plan the increase in industrial stocks of gas was 16 times greater than gas extraction, while in 1956-1959 it was 14 times greater. In 1959 alone, the growth o reserves of industrial gas amounted to more than 500 billion cubic meters, i.e., as much as had bee discovered in prospecting in all the years of the oil-and-gas industry's development prior to 1956. New gas producing areas and big deposits were discovered, such as those in Shebelinka near Khar kov, in the Bukhara-Khiva district of the Uzbek SSR, as well as the Stepnovskoe deposits in the Volga area near Saratov, the Berezovo gas-beari district in Western Siberia, and the Irkutsk and U Viliuisk areas in Eastern Siberia. Many of these deposits (the Karadag, Stepnovskoe, Shebelinka, and others) contain, in addition to natural gas, a condensate (hydrocarbons) which may be turned into liquefied gases (butanepropane), gasoline, die sel fuel, and other highly valuable organic-chemi try products.

The resources that have already been found and substantiated by geological data provide grounds for planning high rates of growth for the gas indu try in the Seven-Year Plan and in the following years. However, under the conditions of the rapi development of the gas industry, industrial reserves of gas must ensure the current level of ga extraction for at least 20 years. This calls for th further extension of prospected and workable gas resources. Thus, geological prospecting and exploration for gas must be intensified in order to carry out the Seven-Year Plan assignment for gas production.

Uzbekistan, the Ukraine, Azerbaijan and the Northern Caucasus are among the chief areas where new industrial gas stocks are to be prepared for exploitation. Prospecting will also cover the areas of Western and Eastern Siberia, Central Asia and the Caspian lowland. The extended volume and scope of gas prospecting requires above all a considerable rise in its technical level so as to prepare the new gas-bearing areas for exploitation within a shorter time and at lower costs. Of great importance here is the utilization of the experience acquired by the oil industry in introducing large-block assembly methods, in the construction and extensive use of movable plant, in the application of turbo- and electro-drills, etc. There are great prospects for introducing various methods of intensifying gas extraction by applying hydraulic fracturing, well perforation under pressure, directed drilling in strata, chemical treatment of the well zone, as well as the separate exploitation of two or more gas-bearing zones of one well. This will provide the opportunity for cutting down the number of wells operated, speeding up the development of gas deposits, cutting down expenses, and reducing the use of pipes.

The successful solution of the task of sharply increasing gas production calls for large-scale automation of prospecting and production. Automation in the gas industry yields a great economic effect. It cuts down the number of service personnel 10 to 15-fold and reduces gas production costs materially. Capital investments in the automation of the gas industry are recouped within approximately 5 years. Comprehensive automation is to be introduced by 1965 at approximately 75% of all the gas fields. This applies, first and foremost, to the Karadag, North-Stavropol, Shebelinka and Krasnodar deposits.

The gas industry is a major sector in the economic competition between the USSR and the USA. The total volume of natural gas output in the USSR compared with the output of the USA, and the average annual growth of production is characterized by the following data (in billion cubic meters):

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Years	Natural gas output		Average annual growth of production	
	USSR	USA	USSR	USA
1940	3.2	75.6		
1945	3.3	111.5	0.02	7.2
1950	5.8	176.8	0.52	13.1
1955	9.0	266.2	0.64	17.9
1958	28.5	310.0	6.5	14.6
1965	132.8	357.4	27.4	6.8

The USSR's lag behind the USA in gas output has been steadily diminishing in the postwar years. Soviet gas output increased by almost 12 times between 1940 and 1959, whereas in the USA the increase was only a little over 4 times. The 1940 level of gas output in the USSR amounted to approximately 4% of the gas output level of the USA, while in 1959 it was already 11.5%. By 1965 gas output in the USSR will rise to about one half of the present level of gas output in the USA. However, until recently the absolute growth of gas output in the USA was greater than in the USSR, although the latter was developing its gas industry at a rapid rate. The result was that the absolute gap between the USSR and the USA in gas output continued to grow.

The Seven-Year Plan marks a new stage in the competition between the USSR and the USA in this important sphere. In the course of 1952 to 1958 gas output in the USA increased from 247 billion cubic meters to 310 billion cubic meters, i.e., by 63 billion cubic meters. In the USSR the 1959 to 1965 period will see gas output increase by more than 100 billion cubic meters.

For many years gas played an insignificant part in the USSR's fuel balance: from 1940 to 1955 its share grew from 2 to 2.6%. In the last 3 years the share of gas in the total fuel balance increased materially and reached 6.5% in 1958. The fulfillment of the Seven-Year Plan will raise the share of gas in the total fuel balance of our country to 21%, and in the power fuel balance to 24.9%. In the United States gas (in units of conventional fuel) accounted for 1/4 of all the power fuel produced in the country in 1955. In 1957 its share rose to 27.7%. These changing trends in the fuel balance structure of the world's two most powerful industrial countries are naturally due to the higher economic indices of the production of gas in comparison to other fuels. The labor requirements, production costs, and capital investments involved in gas production in the USSR (per ton of conventional fuel) are only 5 to 15% of the corresponding indices for the coal industry.

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The transportation and storage of gas is a major problem in the development of the gas industry. The efficient use of natural gas in the national economy calls for organizing its transportation over long distances. The mileage of the gas-pipeline network in the USSR is growing much faster than gas output. Since 1940 gas output has increased 8.7 times, while the length of the gas-pipeline network has been extended by almost 40 times and has reached, according to the January 1, 1960 data, 17 thousand kilometers. Another 26 thousand kilometers of gas mains are to be laid in the course of the current Seven-Year Plan. Thus, in the near future pipeline transportation will no longer limit the growth of gas output and consumption.

The experience of the development of the gas industry in the USA has shown the rapid growth of the gas supply network to be a decisive condition for the large-scale use of this highly economical fuel. The length of gas pipelines in the USA, including the collecting, main and distributing networks, totalled 716 thousand kilometers in 1956. In addition, about 80 thousand kilometers of gas pipelines are used to handle artificial or mixed gas.

Transportation expenses account for a major part of the cost of gas at the point of its consumption. Thus, the production cost of gas at the deposits of the Stryiskii gas fields amounted (according to 1958 estimates) to 5 rubles 58 kopeks per 1,000 cubic meters, while its transportation over the Dashava-Kiev-Briansk gas pipeline costs 27 rubles per 1,000 cubic meters. Saratov gas costs 14 rubles 48 kopeks, and its delivery to Moscow costs 53 rubles 87 kopeks. In all, the share of gas transportation expenses in the cost of gas at the point of its ultimate consumption is about 80% for the USSR and 73% for the USA.

The expenses involved in gas delivery depend on the technical and operating qualities of the gas pipelines and, first of all, on the pipe section. As the pipe diameters are increased the growth of pipeline handling capacity exceeds the increase in capital investments per cubic meter of gas supplied. Thus, when employing pipes with a diameter of 1,020 mm. instead of 720 mm. pipes, the handling capacity of the pipeline rises by 2.3 times, capita investments per unit are cut by 42%, and the delivery cost is cut by 37.4%. The mileage of large section (up to 1,200 mm.) gas pipelines in the USS is being steadily extended. Thus, the share of pipelines with pipe diameters of 750 mm. and ove in the total mileage of gas pipelines in the USSR has increased from 17% in 1956 to 27% in 1958.

The cost of pipes accounts for a considerable portion of the expenses involved in gas pipeline co struction. That is why the reduction of their production costs is an important factor in the further development of the gas industry. During the Seve Year Plan extensive use will be made of various plastics in the pipe-making industry, new types of insulation coatings made of bitumens and coal pit with glass fiber and other materials will be introduced into pipeline construction. An experimenta gas pipeline out of asbestos-cement pipes is bein built in Bashkiria today. Such pipes are corrosio resistant, fireproof and have a longer service life than ordinary metal pipes. The use of new mater als in the pipe industry and in pipeline construction will save metal and reduce pipeline building costs.

Gas storage is another complicated problem. The gas consumption level varies considerably with the seasons of the year and the hours of the day. The scale of seasonal variations in gas consumption is illustrated by the following data (in % of output in 1957):

	USSR	USA
December to February	28.7	33.1
March to May	24.3	26.8
June to August	20.7	18.7
September to November	26.3	21.4

Thus, we see that the "peak" consumption falls in the winter months of January and February. There are areas in the USA where gas consumption on cold days is 15 times higher than in summer. Lower consumption in the summer months leads to the gas pipelines working below capacity while in the winter months, when the gas pipeline work at maximum load, a shortage of gas is felt some areas.

The increased use of gas by industrial enterprises contributes to stabilizing the level of consumption during the different periods of the year and the day. However, the share of gas consumption for household purposes is still quite high, and thus, for the national economy as a whole the consumption of gas is uneven over time. There arises the problem of creating seasonal gas reserves and storing them.

The most economical method of storing gas is that of keeping it in old exhausted natural-gas fields, as well as in different porous geological structures, especially those located near major cities. Adapting natural capacities of this kind calls for a relatively small volume of drilling and small expenses for stationing pump equipment and laying pipeline systems.

In the period from 1947 to 1959 the number of underground storage units in the USA doubled. These storage units help to cover from 28 to 50% of the USA's total requirements for gas during the winter months.

The first underground gas storage unit in the USSR was set up near the city of Kuibyshev. Use was made of the exhausted Bashkatov deposits, into which 10 million cubic meters of purified gas were pumped during the summer months. In winter the gas was supplied to consumers under its own pressure. This solved the problem of uninterrupted gas supply to Kuibyshev and the town of Boguruslan. The Amansk deposits of the "Kuibyshevgas" trust are also being used today as a gas storage unit.

Underground storage units are to be built in the course of the seven years in the vicinities of Moscow, Leningrad and Kiev. Work is under way here to explore porous strata that would lend themselves to gas storage. Since there are no exhausted oil and gas deposits near these cities, it is planned to organize gas storage units in water-bearing areas. Geological prospecting for the purpose of finding structures adaptable to underground storage of natural gas is under way in the areas of Kaluga, near the town of Nezhin, as well as in the vicinity of Kuibyshev. Exhausted oil fields are to be used for storing oil gas in Tataria and Bashkiria.

The construction of underground gas storage facilities near major consumption centers will make for the full utilization of the handling capacities of gas pipelines and ensure a steady gas supply to industry and public services. The organization of underground storage units in oil-producing areas will make for the better utilization of oil gases and reduce their losses.

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The target figures for the development of the USSR's national economy for 1959-1965 formulate the chief tasks of developing the gas industry and the main trends in the use of gas in our country: "Along with meeting all requirements for gas as chemical raw material and as fuel for public and household needs of the population, more than 80% of all the gas produced is to be used in industry."

Today industry consumes 83.3% of all the gas produced in the USSR, while 12% of it goes for public and household needs. The general structure of consumption will not undergo any considerable changes by the end of the Seven-Year Plan. It is the structure of industrial gas consumption that will change considerably.

Electric power stations are the chief consumer of gas in industry: they use 39% of all the gas consumed by industry. Ten per cent of it is used as chemical raw material, 6.5% goes into the cement industry, and 4.6% is used by the machine-building and metalworking industries. Gas has not been widely used in iron and steel production as yet, but when the Seven-Year Plan is carried out this branch of industry will also become a major consumer of gas. In 1965 the use of gas in metallurgy will reach 27 billion cubic meters, i.e., 21.5% of all the gas consumed by industry. This is almost 70% more than is used in the USA's iron and steel industry. The share of machine-building and metalworking in the industrial gas consumption balance will increase sharply (from 4.6 to 9.6%). The total gas consumed by electric power stations will increase 5-fold, but their share in the total consumption of gas will be somewhat reduced.

The structure of the USA's gas balance is distinguished by a high share of gas consumption for household needs. In 1959 it totalled 112.4 billion cubic meters or 34.7% of all the gas consumed in the country. The total consumption of gas in the nonproduction sphere, including that used for heating and by trade establishments, reaches 44% of all the gas consumed in the country. By 1965 household consumption of gas in the USSR is to be raised to 14 billion cubic meters. A comparison of this figure with that of gas consumption for household needs in the USA shows that there are great possibilities for the further gasification of public utilities and households in our country.

The economic advantages of using gas for household needs are quite evident. In Moscow alone the population gains approximately 200 million rubles a year by using gas. However, according to observations of the Sanitation and Hygiene Institute, the intensive use of gas for household purposes in densely populated big cities has led to the pollution of their air space. Inspections carried out in a number of cities have shown that the carbon-dioxide gas content of the air in kitchens of residential houses substantially exceeds the limits fixed by sanitation requirements. The improvement of burner and oven design, as well as better ventilation, do not always adequately solve the problems involved in improving the sanitary conditions of kitchens and city air. Thus, in determining the prospects of gasification, there arises the important problem of what is more expedient — employing gas directly for household needs, or working to meet household needs by supplying electricity, using gas for the generation of electric power.

A comparison should be made of the economic efficiency of transporting gas through pipelines and intra-urban gas mains with that of transmitting power to the consumers of the electricity generated at the location where gas is produced. Rough calculations show that electric power transmission today is still much more expensive than the transportation of gas. However, the progress achieved in power-transmission engineering is leading to a steady and rapid reduction of the costs involved in power transmission. Electricity will probably fully replace gas in the household of the future. This, of course, should not serve as grounds for slowing down the rate of gasification for public services. Along with a gradual expansion in the use of electricity for heating, cooking, etc. (especially in those areas where much cheap electricity is available), gasification will remain the chief trend in improving the power supply for community services for many years to come. It should be borne in mind that approximately 100 billion kilowatt-hours of electric power are being generated in the USA from gas, while in the USSR the figure is only 30 billion kilowatt-hours. Moreover, as we have already mentioned, many times more gas is being used for household needs in the USA than in the USSR.

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The 21st Party Congress and the June 1959 Plenary Session of the Party Central Committee have set the task of developing on a large scale the production of chemical goods by making use of natural and oil gases, as well as of oil refinery gas.

Natural gas is both a highly economical fuel and a most valuable raw material. Its all-round processing yields a wide range of chemical source materials, such as methane, ethane, butane, ethylene, propylene, butylene, as well as aromatic hydrocarbons — benzol, toluene, xylene, etc.

The cheapness of natural gas and its high content of valuable components of chemical synthesis permit the setting up of powerful combined organic chemistry plants, making extensive use of integrated automation in chemical technological processes. All this determines the high economic efficiency of using natural and oil gas as raw materials for organic synthesis. Capital investments per unit of output in the construction of capacity for producing chemicals from gas and the production costs of these chemicals are considerably lower than in the case of producing these chemicals from other kinds of raw materials. Thus, the cost of acetylene — a source product for manufacturing plastics, synthetic rubber, artificial fibers, solvents, etc. — which is derived from calcium carbide, is 30 to 40% higher than the cost of acetylene produced on the basis of gas processing, and capital investments per unit of output are 20 to 30% greater. These data apply to furnaces and other equipment of comparatively low capacity (2.5 thousand tons of acetylene a year). In the case of furnaces for 6 to 10 thousand tons of acetylene a yea with the corresponding enlargement of the entire technological equipment and the rational utilizatio of by-products, the advantage of producing acetylene from gas becomes still greater.

Under the Seven-Year Plan the output of acetylene is to be increased by several hundred thousan tons. The fulfillment of this assignment, if the carbide method were to be employed, would require some 2.5 billion rubles of capital investments. Th manufacture of acetylene from methane will permit us to reduce the total sum of capital investments to 1.2 billion rubles; the production cost of the product will be 1.5 times lower than with the carbide method. Moreover, the production of eac ton of acetylene from gas yields enough valuable waste to make 4 tons of ammonium for the production of nitrogen fertilizers.

In 1958 only 36% of the capacity of nitrogen fertilizer factories was operating on gas raw mat rial (coke gas). All the nitrogen plants that are being built are designed for processing gas, particularly waste from acetylene manufacture. This cu down the labor input in nitrogen production and reduces the capital investment per unit of output by 33%. If applied to the entire production increase planned for the seven years, this will result in th saving of 4 billion rubles.

The following data characterize the efficiency o producing various chemical products from natura gas (the expenses involved in the production of chem goods from other raw materials are taken as 100):

	Capital investments	Production costs
Ammonia	66	50
Synthetic ethyl alcohol	53	80
Synthetic rubber	63	92
Polymers for plastics	42	77
Formalin	67	49
Acetylene	80	37

The establishment of large enterprises for the comprehensive utilization of natural and oil gases on the basis of the rational cooperation and combination of production will permit us to carry out the task posed by the May 1958 Plenary Session of the Party Central Committee and the 21st Party Congress concerning the sharp increase in the output of chemical products with the least possible capital investments. The total saving of capital investments to be derived from the use of natural and oil gases as raw materials will amount to approximately 5 to 6 billion rubles for the period 1959 to 1965; the annual saving on operating expenses will come to 1.3 billion rubles.

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No less efficient is the use of gas as fuel.

It has already been pointed out that gas has been most widely applied at thermal power stations. The resolutions of the 21st Congress of the CPSU indicate that the priority construction of thermal power stations operating on cheap coals, natural gas and mazut should be the chief trend in the development of the USSR's power engineering for the years 1959 to 1965. This will provide for a faster rate of power development with lower capital expenditures and a higher technical level.

When power stations operate on gas, the efficiency coefficient of the boiler plant reaches 92%, whereas with coal it is 85 to 89% (depending on the grade of coal used). The use of gas as fuel reduces considerably the power consumption for the power station's own needs, since there is no input of power for coal grinding, ash removal, and the like. There is also a 20% reduction of servicing personnel engaged in the storage, handling and preparation of coal for burning. Thus, the Moscow Heating and Power Generating Plant No. 12, which operates chiefly on Donbas and Moscow area coals, uses gas in the summer months. During this period all the workers in the fuel handling department (89 persons) and part of the workers in the boiler departments (40 persons) are shifted to other work — repairs, building construction, etc. If the Heating and Power Generating Plant operated on gas the year round, the saving on wages would be 126 thousand rubles a year.

The advantages offered by gas are not being fully utilized in power engineering today; it is only when other consumers cut down their gas consumption that gas is supplied to power stations. The share of gas in the power station fuel balance has risen from 3.3% in 1955 to 10.7% in 1958. By 1965 the share of gas in the total fuel input at thermal power stations is to be raised to 17%. The corresponding figure for the USA was (according to data for 1958) 24%.

Mazut usually serves as a reserve fuel when natural gas is used as the basic fuel. The use of natural gas and mazut permits a considerable reduction in the volume of power station construction work, since there is no need to erect a coal-storage unit, to build coal-feeding, dust-preparation, ash-removal and ash-trapping premises. There is a considerable shortening of railway tracks, elimination of auxiliary premises, and the overall dimensions and weight of the boiler plant are diminished. According to the Teploelektroproekt designing organization, all this results in the building work taking 8 to 10 months less time and in the capital investments being reduced by 20 to 25% compared with power stations working on coal dust.

The lower costs of the power station and the reduction of its servicing personnel, the cutting of expenses on current repairs and capital overhaul, as well as the lower cost of gas and liquid fuel (as compared to coal), make for a general reduction in the cost of electricity by 27 to 75% (depending on the distance the fuel has to be transported).

The use of gas as fuel in the boilers of industrial enterprises also yields a considerable economic effect. Thus, the gasification of the steam-power departments at the Dorogomilovo Chemical Plant permitted the release of 33 workers who had been servicing the fuel preparation and feed. They have been replaced by 4 fitters of the gas distribution station. Thus, gasification permitted the freeing of 29 workers, thus yielding a saving on wages of 272 thousand rubles. Coal (in terms of one megacalorie) used to cost 32 rubles, while gas costs 25 rubles. The annual output of 200 thousand megacalories yields a saving of 1,400,000 rubles; together with the saving on wages the total saving amounts to 1,672,000 rubles. The entire reconstruction of the steam-power department cost the factory 197,000 rubles. In addition, they installed a spare boiler operating on mazut, which cost 120,000 rubles. Thus, the total saving (excluding capital expenditures) amounted to 1,355,000 rubles, and the expenses on the installation of gas equipment were recouped within a few months.

Some of the properties of natural gas — high combustion temperature, chemical inertia of the flame, purity and homeogeneity of composition — make it especially valuable for iron and steel enterprises. This applies particularly to high-quality steel.

Only 1.5 to 2% of the total gas used in industry is employed in iron and steel production. By 1965 the quantity of gas used by this branch is to be increased 120-fold, and its share will make up 21% of total industrial consumption. Because of the absence in natural gas of ashy combustion products and corrosive compounds (sulphur dioxide, etc.), its use prolongs the service life of furnace lining and, thus cuts down the expenses involved in its repair. The use of gas permits us to simplify the design of open-hearth furnaces and to reduce their construction costs, improving the labor hygiene conditions in the shops at the same time.

Highly calorific oil fuel and gas have not yet been widely applied in Soviet metallurgy. Highly calorific fuel is used to produce only 1/5 of all the steel in our country, while in the USA all open-hearth furnaces are fired by highly calorific fuel — coke gas, mazut (53% of the total open-hearth-furnace fuel balance), and natural gas (14.6%).

Natural gas in open-hearth steel production in the USA is employed not only as fuel, but also for atomizing mazut, which considerably enhances production efficiency. Thus, at the Granite City Steel Company plant the expenses for fuel were cut by 12% with the use of gas, (1) while the output capacity of the furnace increased by 2.2% in the first series of experiments and by 15.4% in the second series. At the Scullin Steel Company plant, when steam was replaced by natural gas, melting time was reduced by 10%, and the fuel input per ton of steel was cut by 8.8%. (2)

Until recently the main reason for the USSR lag in the use of highly calorific fuel in metallurgy lay in the insufficient gas and mazut production. With the rapid development of the oil and gas industry, the transition of open-hearth furnaces to high-calorific fuel becomes a most urgent task in improving steel producing techniques.

According to preliminary calculations performed by the Gipromez Designing Bureau, the transition of functioning open-hearth furnaces to natural gas firing will permit an increase in their productivity by 10% as compared with their operation of a mixture of coke and blast-furnace gases. This will increase steel output by 2 to 2.5 million tons by 1965. According to rough estimates the use of 10 to 11 billion cubic meters of gas will save over 1 billion rubles of capital investments. The decrease in refractory material for furnace repairs alone will cut down operating expenses by approximately 3 rubles per ton of steel.

Gas has come into use at our iron and steel plants comparatively recently. The furnaces of the Krasnyi Octiabr Steel Works in Stalingrad were shifted to natural gas firing at the close of 1955. At first there were 3 open-hearth furnaces with 50-ton capacities, the heating devices of the enamel hardware shop, 15 thermal ovens in the gauging shop, and a number of other heaters working on natural gas at the plant. By March 1958 all the open-hearth furnaces were shifted to natural gas. According to approximate data, the total saving derived from lower fuel costs and reduced compressed-air and steam consumption resulting from the use of natural gas, amounts to about 10 million rubles a year.

In May 1957 the open-hearth furnaces at the Andreev Plant in Taganrog went into operation on natural gas; in October 1957 the same was done wit the chief plant of the Liebknecht Works in Dnepropet rovsk. The use of natural gas at this enterprise re duced rejects of steel-pipe ingots, improved the co ditions for sulphur removal, and cut mazut consum tion. The fuel component in the cost of a ton of open-hearth metal decreased by 25 to 28%, the input of steam and electric power — by 15 to 17%. I all, expenditures for the hearth-refining of a ton of metal have been cut by 4 to 5%. A big open-hearth furnace at the Zaporozhstal Plant which used to be fired by a mixture of coke and furnace gas with mazut, was put into operation on natural gas with the application of oxygen. The duration of each melting in this furnace became an hour shorter, furnace capacity increased by 20%, and the input of conventional fuel decreased by 20 kg. per ton of steel. According to preliminary calculations, som 5 thousand tons of additional steel will be produced annually.

Soviet metallurgists have been attempting for a long time to employ natural gas for making cast iron in cupolas, which would permit us to save grea quantities of metallurgical coke. By replacing cok with gas, the production cost of usable castings could be reduced by approximately 25 rubles per ton. In that case the Moscow Stankolit Plant alone would b able to save about 2 million rubles a year. A com bined coke- and-gas cupola has been built in the Kharkov Electro-Mechanical Plant. One ton of cas iron made in such a cupola requires 75 kg. of coke and 35 to 40 cubic meters of gas, instead of 150 kg of coke. The smelting is done without oxygen blow ing. Cupola efficiency is raised by 20 to 30%, and the annual saving amounts to 400 thousand rubles.

The use of gas in blast-furnace smelting, consuming 100 to 110 cubic meters of gas per ton of cast iron, has permitted us to cut coke input by 10 to 15% and to effect a 5% rise in furnace efficiency At the Petrovskii Plant cast iron is made with natural gas mixed with oxygen. This has yielded still better results: coke input has gone down by 20% and furnace efficiency has increased by 10%. The use of one billion cubic meters of gas in the blast-furnace process yields a saving of 400 millio rubles of capital investment and some 100 million rubles of operating expenses. In the near future 5 blast furnaces are to be shifted to a new technolog cal process which involves the use of natural gas.

As a whole, the use of natural gas in iron and steel production will permit us to save over 10 billion rubles on capital investments and 3.8 billion rubles on operating expenses in 1965.

Gas will also be widely applied in a number of other industries, particularly in the production of building materials. The technological processes in the building-materials industry are characterized by thermal methods of raw-material processing — drying, annealing, steaming, etc. These operations cover 20 to 25% of the cost of building materials.

The cement industry is among those that consume the greatest amounts of heat. The baking of cement clinker is done at temperature of 1400 to 1450°C, the expenses for fuel making up about 50% of clinker cost and about 35% of the production cost of cement.

Until now coal has been the dominant type of fuel in cement production. In recent years, however, the share of coal has been diminishing, while the share of gaseous fuel has been steadily and sharply increasing. In 1950 coal constituted 86% of all the fuel employed in the cement industry, whereas in 1958 its share was down to 60%. By the end of the Seven-Year Plan period it will diminish to 28.3%. Meanwhile, the share of gas has risen from 0.9% in 1950 to 36.8% in 1958. In the course of the seven years the use of gas in the cement industry will grow almost 4 times and will make up 2/3 of all the fuel burned in this branch. The gasification of the cement industry will make it possible to increase cement output in 1965 by 4.5 million tons without any additional capital investments.

Many cement factories have been shifted to gas in recent years. Eleven out of 76 cement factories were operating on gas in 1957. They accounted for 16.3% of all the cement produced in the country. In 1958 the Volsk and, partially, the Belgorod cement factories were put on gas operation.

Cement production requires unwieldly facilities for storing fuel and preparing it for combustion. The fixed assets used for these purposes, including storage, handling and leading facilities, make up over 20% of the total fixed assets of cement factories. As much as 5 to 10% of all workers in the industry are engaged in fuel preparation operations. The expenses connected with fuel preparation are 7 to 9 rubles per ton of prepared coal dust.

As the furnaces of cement factories are put on gas operation, all expenses involved in fuel preparation will be eliminated and this will, naturally, affect the production cost of cement. Another factor that will reduce the cost of cement is the lower cost of gas, as compared with coal. In all, if the furnaces are shifted to gas, the cost of cement clinker may be reduced by 30%, as compared to its cost when produced in coal fired furnaces (with due account of the expenses for extracting and transporting the fuel). The stability of the physico-chemical properties of gas and of its calorific power permit the maintenance of a more uniform thermal schedule in the furnace. This prolongs the furnace's service life and reduces idle-standing periods due to lining overhauls.

The introduction of gas into the production of bricks — another and no less important type of building material — also yields a great economic effect. In 1956 the driers and tunnel kilns of the Beskundnikovo Ceramics Plant were the first to be put on natural gas operation. This has permitted a rise in the yield of bricks per cubic meter of baking tunnel by 20 to 25%. Two annular kilns of the same factory were shifted to natural-gas baking in 1957. Brick output from these kilns went up from 1,632 to 1,940 units when this was done.

The data submitted by a number of building-materials enterprises in Moscow show that the application of natural gas has made for a 7 to 12% growth in labor productivity, a sharp decline in the number of workers engaged in handling and loading operations, as well as in the number of stokers, a reduction of the fuel input per unit of output, and a decline in the number of rejects.

The examples cited in the article show the high economic efficiency of employing gas in various branches of production. The sharp increase of gas output in the USSR envisioned by the Seven-Year Plan will contribute to a further rise in the technical level of socialist industry, to the growth of the productivity of social labor.

Footnotes

(1) American Institute of Mining and Metallurgical Engineers, Proceedings of 38th Conf., New York, 1955, pp. 239-240.

(2) Ibid., pp. 212-213.

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A. VOINOV AND I. SEMENOV:

The Socialist Division of Labor in the Fuel and Power Branches of Industry

The more rapid development of heavy industry, including the fuel and power branches, is of primary significance for creating the material and technical base of communism in the countries of the world socialist system. The level of development of these branches determines, to a great extent, the volume of production in all other branches, the amount of electric power per industrial worker, and the mechanization of the national economy. The comprehensive electrification of the socialist countries assumes especially great importance today, for it creates the basis for achieving the highest productivity of labor in all branches of the economy.

The world socialist economic system as a whole possesses all types of power resources in quantities sufficient to fully meet all the requirements of the socialist countries. However, the distribution of these resources among the various countries is extremely uneven. That is why their rational utilization, which takes into account the close connections between the separate types of power resources and the differences in their technological characteristics, becomes possible only on the basis of the effective international socialist division of labor. The role of inter-state specialization and cooperation in the fuel and power branches becomes increasingly great in connection with the fact that the fuel and power base in a number of socialist countries is not yet developed to a sufficient extent.

The international division of labor in the fuel and power industries has a number of specific features. It is determined, first of all, by natural conditions, i.e., by the availability or lack of the respective power resources and their accessibility for utilization. To save time and socially necessary labor, primary attention should be given to the rational exploitation of those fuel deposits and sources of energy which can be developed in the shortest possible period of time with the least capital investments per unit of output. Their distribution is the basic factor determining inter-state specialization in the fuel and power branches and the industries related to them.

Transportation problems also play an important role in the development of the international division of labor in the fuel and power industries. An excessive expenditure of socially necessary labor on the transportation of fuel reduces the economic effectiveness of inter-state specialization in this sphere.

To ensure a rational inter-state socialist division of labor in the fuel and power industries it seems advisable to proceed along the following lines in the development of the fuel and power base in the countries of the socialist camp:

A. Each country should, first of all, make the best possible use of its internal power resources. However, in a number of cases the lack of certain types of fuels and a shortage of electric power in particular countries stems from natural and economic factors which it is impossible to remove at the present time. This deficiency should be met b deliveries of fuel and electric power from the other countries. Such deliveries are also advisable when the border regions of neighboring countries cooperate in the economic field. It is also highly desirable for the countries concerned to grant other socialist countries long-term special credits to be used for capital investments in the fuel and power industries.

B. The international division of labor in the fue and power industries should promote a higher rate of growth of the power industry than of industrial production as a whole in each of the socialist countries and in the entire world socialist economic sy tem. It must also provide the necessary condition for meeting the requirements of the socialist countries for scarce types of power resources and contribute to the achievement of the most rational structure of the fuel balance.

C. In solving problems of the international division of labor in long-term planning, it is advisable in cases where it is economically advantageous, t gradually replace the now predominant railway transportation of fuel by pipeline and, to some extent, water transportation, and to promote the transmission of electric power over high-voltage lines. The extension of the network of oil mains, gas mains and high-voltage power transmission lines will considerably increase the possibility of maneuvering with the various types of power resources.

Since the countries exporting fuel and electric power usually strive to exchange these export items for other commodities of the raw material group, it appears rational to make wider use of multilateral clearing in settling accounts among the countries concerned.

In elaborating the lines of development of the international socialist division of labor in the fuel and power industries, we must first of all determine the types and quantities of fuel and energy it will be expedient to develop in the separate countries, proceeding both from the interests of the respective countries and the socialist camp as a whole. In this respect it is very important to elaborate scientific methods of comparing the basic economic indices in the fuel and power industries of the socialist countries. The efforts of economists both in the Soviet Union and in the people's democracies are directed to the elaboration of such methods.

Let us examine a number of important factors which determine the development of the fuel and power branches. First and foremost among these factors is the availability of various types of fuel and energy in the socialist countries.

The Soviet Union is fully provided with all types of power resources and today holds first place in the world in the reserves of such resources. At the beginning of 1956 our country had 57% of the world's geological reserves of coal and 60% of the world's reserves of peat. The USSR also possesses considerable reserves of oil. The hydropower resources of all Soviet rivers are estimated at 420 million kilowatts of capacity and 3,690 billion kilowatt-hours of electric power output (the technical possibilities for developing hydroresources correspond to 194 million kilowatts of capacity and 1,700 billion kilowatt-hours of output of electric energy). In its water-power reserves the Soviet Union is second only to the Chinese People's Republic. According to estimates of the UN Economic Commission for Europe the power resources of the European people's democracies are evaluated as follows (in billions of kilowatt-hours):*

	Coal (total geological reserves	Oil (known reserves)	Natural gas (industrial reserves)	Hydro-power (industrial reserves)**	Total power resources		Per capita power resources (as of 1955 in thousands of kwh.)	
					total quantity	evaluated in 25% coefficient***	total quantity	evaluated in 25% coefficient***
Poland	1,169,750	32	—	13	1,176,782	305,446	43,131	11,138
Czechoslovakia	79,250	12	32	12	91,294	31,824	6,975	2,431
GDR	77,400	—	—	2	79,400	21,350	4,453	1,198
Rumania	6,402	960	2,608	27	39,970	29,493	2,114	1,686
Bulgaria	4,620	—	—	11	15,620	12,155	2,069	1,610
Hungary	9,746	139	65	2	11,949	4,480	1,202	457
Albania	—	36	—	5	5,036	5,009	3,613	3,593

* In compiling this table the following coefficients were used: 1 kg. of coal = 8 kwh., 1 kg. of brown coal and lignite = 2.5 kwh., 1 cubic meter of natural gas = 10.6 kwh., 1 kg. of liquid fuel = 12 kwh., 1 kg. of other types of fuel = 4 kwh.

** The total hydro-power resources have been estimated on the basis of the utilization of annual resources in the course of a thousand years.

*** It is assumed that during the conversion of fuel into energy the yield comprises 25%.

These figures show that the European socialist countries are unequally provided with power resources, both in respect to quantity and quality.

The reserves of coal and coking coal are concentrated mainly in the USSR, Poland and Czechoslovakia. In the other socialist countries of Europe brown coal and lignite reserves predominate. Because of the unfavorable structure of coal deposits in Hungary and Rumania, the development of these deposits entails especially high production costs.

The known reserves of oil and gas are concentrated mainly in the Soviet Union and Rumania. Rough estimates show that about 80% of the total known oil reserves in the European people's democracies are in Rumania. In the reserves of natural gas Rumania holds third place in the world after the Soviet Union and the USA. It should also be noted that Rumanian gas is of a very high quality (98-99.8% methane).

The Chinese People's Republic has tremendous hydro-power resources (580 million kilowatts), great reserves of coal (1,500 billion tons) and some reserves of oil. However, the known oil deposits are concentrated mainly in the Northwestern regions of the country where their development is slowed up because of transportation difficulties. Deposits of natural gas have also been discovered in these areas. The Korean People's Democratic Republic is fully provided with resources of power producing coals, but is forced to import coking coals. The hydro-power resources of the Korean People's Democratic Republic which it is technically possible to utilize comprise over 7 million kilowatts. The Mongolian People's Republic has reserves of coal and brown coal. The Democratic Republic of Viet-Nam has large reserves of anthracite. It should also be noted that the power resources of the Asian socialist countries have not yet been adequately studied.

The socialist countries have always paid great attention to the development of their fuel and power base, for this determines to a great extent the level and rate of development of the productive forces. The following table shows the growth of production in the fuel and power branches of industry in the socialist countries during the past 10 years.

	Coal		Oil		Gas		Electric Power	
	Million tons				Billion cubic meters		Billion kilowatt-hours	
	1950	1959	1950	1959	1950	1959	1950	1959
USSR	261.1	506.6	37.9	129.6	6.18	37.2	91.2	265.1
Poland	82.8	108.3	—	0.17	0.2	0.42	9.4	26.4
Czechoslovakia	44.9	79.5	0.07	0.12	2.3	3.7*	9.3	21.9
GDR	140.0	218.0	—	0.04	1.5	3.1	19.5	37.2
Hungary	13.3	25.3	0.5	1.1	0.4	—	3.0	7.1
Rumania	3.9	8.0	5.0	11.4	3.2	5.8	2.1	6.8
Bulgaria	5.9	15.3	—	0.2	—	—	0.8	3.9
Albania	—	0.26*	0.1	0.4*	—	—	0.02	0.15*
Chinese People's Republic	42.9	347.8	0.2	—	—	—	4.5	41.5
Korean People's Democratic Republic	3.5	8.9	—	—	—	—	4.6	7.8
Democratic Republic of Viet-Nam	—	1.5**	—	—	—	—	—	0.21**
Mongolian People's Republic	—	0.5**	—	0.03**	—	—	—	0.08**

* 1957
** 1958

As a result of the powerful expansion of the coal mining industry in the socialist countries, their share in the world's coal output today is over 50%. Especially great successes have been scored by the coal mining industries of the Soviet Union and the Chinese People's Republic. The USSR now holds first place in the world in the total volume of coal output and has nearly caught up with the USA in the per capita output of coal. China has outstripped Britain in coal output and now holds third place in the world after the USSR and the USA. In the years of the people's power the production of coal has also increased considerably in Bulgaria, Hungary, Rumania, the Korean People's Democratic Republic and the Democratic Republic of Viet-Nam.

Oil extraction in the socialist countries in 1959 topped the 1950 figure by more than 230%. The share of the socialist countries in the world's output of electric energy has increased from 15% in 1950 to 20% in 1959. Some of the socialist countries have already surpassed the highly developed capitalist countries in the per capita output of electric energy. Thus, the per capita production of electric energy in the GDR in 1959 was 2,153 kilowatt-hours, thereby surpassing the FRG and assuming 3rd place in Europe and 5th place in the world. Czechoslovakia has outstripped France and Italy in the per capita output of electric power (1,614 kwh.).

The nature of power resources and the attained level of production of the main types of fuel determine the structure of the fuel and power balance of the socialist countries. In all the European socialist countries except Rumania and Albania the main type of fuel is coal. In the past decade the share of coal in the production of all types of fuel remained practically unchanged. The share of coal in the total fuel balance of the USSR in recent years has decreased somewhat as the result of the rapid growth of oil and gas extraction. The share of oil in Rumania (in terms of conventional fuel) invariably exceeds one half of the total fuel output.

Despite the fact that in the past decade the socialist countries sharply increased the volume of production in the fuel and power branches of industry, the production of fuel in many of the people's democracies nevertheless lagged behind the rapidly growing requirements of their economies. There was a considerable gap between the increase in the mining and consumption of coal in Hungary, the GDR and Poland. The same can be said about coke in Bulgaria, oil in Hungary, etc. This has led to increased deliveries of fuel to the countries which import it, and to a reduction in the export of several types of fuel from the countries which export it.

In recent years a change has occurred in the structure of fuel and power consumption in the socialist countries in favor of liquid fuel and at the expense of the share of coal and brown coal. The consumption of hydro-power has also increased somewhat, although the share of hydropower in the total fuel and power balance of the European people's democracies is still below 1%.

The reduction of the share of coal used as fuel, and the growth of the share of oil and natural gas, will constitute the main directions in the further improvement of the structure of the fuel and power balance. As we know, the Soviet Union has taken the path of stepping up the extraction and processing of oil and gas. By 1965 the share of coal in the total output of fuel in the Soviet Union will decline to 43% compared to 60% in 1958, and the share of oil and gas will correspondingly increase from 31% to 51%. In the other socialist countries the share of coal in the total output of fuel will apparently remain practically unchanged in the next 10 to 15 years. However, imports of oil and gas by these countries, as well as their share in fuel consumption, will increase considerably.

As a result of the steadily increasing electrification of railways and the transfer of railway transport to diesel-electric traction, a further reduction will take place in the quantity of coal consumed by railway transport. At the same time there will be an increase in the utilization of coking coal in metallurgy and of cheap power-producing coals in the production of electric energy. The role of oil, natural gas and coal as raw material for the chemical industry is also increasing every year. They are used in the production of a number of valuable chemical products.

As the economy of the socialist countries develops, the strengthening of their power industry assumes ever increasing importance. In this connection the role of economic cooperation and the international division of labor in this sphere also increases.

Today the international division of labor in the fuel and power industries of the socialist countries is carried out along two main lines: (1) Along the line of coordinating plans and other forms of economic and technical cooperation of the socialist states in prospecting for power resources, in the construction of new mines, electric stations, enterprises of the oil and gas industries, as well as in the exchange of production experience designed to step up the development of and strengthen the fuel and power industries in separate socialist countries; (2) Along the line of direct mutual deliveries of various types of power resources: coal and anthracite, brown coal and briquettes made out of it, crude oil and oil products. At present the share of electric power in the mutual deliveries among the socialist countries is insignificant, but in the future it will steadily increase.

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Cooperation among the socialist countries in the development of the coal industry is playing an important part in increasing coal production and ensuring technical progress in this field.

The Soviet Union, which has amassed tremendous experience in the construction of coal mines and open pits, is granting particularly great assistance to the people's democracies. The capacity of the coal mining enterprises built or under construction in these countries with Soviet assistance comprises 37.6 million tons of coal a year. Poland and Czechoslovakia are drawing on Soviet experience in the organization of high-speed drifting of mine shafts and horizontal excavations, the deepening of mine shafts in water-filled rock and the introduction of various pit-propping materials to replace timber. The Soviet Union, in turn, is utilizing the experience gained by the Polish coal industry.

The socialist countries are paying great attention to the mechanization of work in the coal industry and to the improvement of working conditions for miners. The Soviet Union, Czechoslovakia and the GDR are completing the mechanization of the main labor processes of coal excavation, its transportation inside the mine and its loading into railway cars. The mechanization of coal-mining in Poland, China and other people's democracies is constantly increasing. These successes have been achieved to a considerable degree because of the economic, scientific and technical cooperation among the socialist countries. Thus, Soviet cutter-loaders and other mining machines are being widely used in all the people's democracies. A developed coal-mining machinery industry has been created during the years of people's power in the GDR, Poland and Czechoslovakia. The machines and equipment manufactured in these countries meet both their internal requirements and the needs of other socialist countries.

Scientific and technical cooperation in the fuel and power industries relieves the fraternal countries of additional material expenditures and saves much effort and time.

In recent years some socialist countries have begun to develop their coal industries on the basis of special-purpose credits for capital investments granted them by other socialist states. Thus, the German Democratic Republic granted Poland credit for the development of rich deposits of brown coal in the vicinity of Turov and Konin (Poland). The GDR is carrying out designing work on credit and delivering mining equipment and apparatus to Poland valued at 400 million rubles. Poland will repay the credit by deliveries of coal and electric energy. Czechoslovakia has also granted Poland a credit of 250 million rubles to develop its coal industry. In turn, Poland has undertaken to supply Czechoslovakia with power-producing coal, both as repayment of the credit and in the form of regular sales transactions.

Ninety-nine per cent of the growing coal requirements of the socialist countries are being met by their own coal output and deliveries from other socialist countries. The main coal exporters in the world socialist market are the Soviet Union, Poland and Czechoslovakia. In 1959 the USSR exported more than 6.8 million tons of coal and anthracite to the socialist countries, including: 5.1 million tons to the GDR, 1 million tons to Czechoslovakia, 615 thousand tons to Poland, 67 thousand tons to Hungary, and 74 thousand tons to the Mongolian People's Republic. Soviet coal deliveries to the GDR covered about 50% of that country's requirements for coking coal. Czechoslovakia imports power-producing coal from the Soviet Union. Poland buys certain grades of Soviet coal used for the blast-furnace coke charge. In turn, the Soviet Union purchases coal from Poland (4.1 million tons) and China (a little more than 200 thousand tons).

Coal is the most important item in Polish exports. During the postwar years Poland has exported over 250 million tons of coal, i.e., more than 25% of its total coal output. As a result of the formation of a world socialist market Poland has a guaranteed market for its coal. Having strengthened its coal base as a result of the reunification with its Western territories, Poland has outstripped Britain and Western Germany and stepped into first place among European coal exporters. The high quality of Polish coal has a favorable effect on the development of the country's coal exports. Polish coal is highly calorific, has a low ash content, and is very firm, allowing it to be transported over long distances and to withstand overloads. At present, Poland exports mainly power-producing and coking coals. Because of its high quality and the large variety of grades available, Polish coal is greatly in demand on the world socialist market. The GDR, the Soviet Union, Czechoslovakia and Hungary are the biggest importers of Polish coal. Deliveries of coal and coke from Poland contribute to the development of the productive forces in the European people's democracies.

Polish brown coal is also acquiring an increasingly greater export value. This coal is mined mainly at the Turov deposits. Polish brown coal is intended mainly for export to the GDR.

Czechoslovakia exports certain grades of coal, receiving other grades in return. Czechoslovakia has certain export resources of coking coals but is short of power-producing coal. Since it is impractical to use coking coal for power-producing purposes, Czechoslovakia imports power-producing coal from Poland in exchange for high grade coking coal. Czechoslovakia exports coking coal to other socialist countries as well. It also exchanges its brown coal for brown coal briquettes from the GDR.

This type of specialization permits the three above-mentioned countries to utilize their natural resources in the most rational way. It is also expedient from the point of view of transportation, for the enterprises in Poland and Czechoslovakia utilizing the exchanged grades of coal, as well as the Czechoslovakian enterprises supplying brown coal and the GDR enterprises supplying brown coal briquettes, are situated very close to each other. This is only one vivid example of the mutually advantageous international socialist division of labor in the coal industry.

The GDR is a major importer of coal in the world socialist market. In 1958 the GDR's imports of coal from other socialist countries were more than double the 1950 level. The GDR imports most of its coal from the Soviet Union and Poland. As we have already mentioned, the GDR imports brown coal from Poland and, in small quantities, from Czechoslovakia. In turn, the GDR exports brown coal briquettes and concentrated brown coal to a number of capitalist countries and, in small quantities, to the countries of the socialist camp.

Among the importers of coal on the world socialist market are also Hungary and Rumania.

The individual socialist countries do not have equal possibilities for the further expansion of their coal exports. In the current Seven-Year Plan period the Eastern regions of our country will be responsible for the greater part of the increase in the Soviet Union's coal output. The output of coal in the Western regions of the USSR will increase to a considerably lesser extent. At the same time it should be noted that the cost of coal mined in the Western regions is high, whereas local requirements for coal are steadily growing. All this limits the possibilities of expanding coal exports for delivery to the European people's democracies. However, the qualitative structure of Soviet coal exports will undergo considerable change in the next few years: the share of power-producing coal will drop and the share of coking coal will increase. Exports of ordinary coal will be replaced on an increasing scale by concentrated coal exports.

The European people's democracies, notably Poland and Czechoslovakia, have considerable possibilities for increasing the output and export of coal in the next few years. Especially promising in this respect are the Upper-Silesia Coal Basin (Poland) and the Ostravsk-Karvinsk Coal Basin (Czechoslovakia), which is an extension of the Silesia coal deposits.

The socialist countries attach especially great significance to meeting the requirements of the metallurgical industry for coke. The mining of coking coal in the socialist countries is developing at a more rapid pace than the overall output of coal. The XI Session of the Council for Economic Mutual Assistance, convened in May 1959, held a special discussion on the question of the priority development of the resources of coking coal in the European people's democracies. By 1965 these countries intend to raise the output of coking coal by 53.5%, parallel with a general increase in the output of coal by 21%. It is planned to raise the output of coking coal in Czechoslovakia by 60% and in Poland by 50%. The output of this grade of coal in Bulgaria will increase several-fold.

The implementation of coordinated measures for the further development of the coal industry and the considerable expansion of mutual deliveries will permit the socialist countries to fully meet their coal requirements.

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As we have already noted, the consumption of oil and gas in the socialist countries is steadily growing. The utilization of oil and gas as fuel makes it possible to ensure higher technical and economic indices for the entire national economy. In addition, the extraction of oil and gas is much more economically effective than the mining and extraction of other types of fuel. Thus, in 1957 the production cost of a ton of oil (in terms of conventional fuel) in the USSR was 3.5 times less, and the cost of a ton of gas was 12 times less, than that of a ton of coal; and labor expenditure necessary for the extraction of a ton of oil and gas were respectively 6 and 20 times less than those necessary to mine a ton of coal. In addition, oil and gas are very effectively used as raw materials for the chemical industry in the production of synthetic materials.

The national economic plans of the socialist countries envisage a considerable increase in the utilization of oil and gas. However, the existing level of oil and gas extraction in the majority of the socialist countries is not sufficient to meet their requirements. That is why the Soviet Union, in accordance with the principles of the international socialist division of labor, covers by its deliveries the shortage of oil and oil products existing in the fraternal countries. In 1959 the Soviet Union exported nearly 6 million tons of crude oil to countries of the socialist camp, as well as about 5 million tons of oil products. The main importers of Soviet oil were Czechoslovakia (1.8 million tons), the GDR (1.6 million tons), Hungary (1.2 million tons) and Poland (0.7 million tons). Soviet oil products were delivered to all socialist countries, including China (2.4 million tons), Poland (1.1 million tons), Bulgaria (0.6 million tons), the Korean People's Democratic Republic (over 0.2 million tons), and so on.

The Soviet Union, in turn, imported 3 million tons of oil products from Rumania, as well as a small quantity of oil and bitumen from Albania. In 1959 the Soviet Union delivered more than 200 million cubic meters of combustible gas to Poland.

The oil refining industry is being increasingly developed in the socialist countries. Thus, the oil refining industry of the Rumanian People's Republic ensures the processing of all the oil extracted in the country. A considerable part of Rumanian oil products is exported. The oil refining industry in the other people's democracies is also developing at a rapid pace.

To meet the ever growing requirements of Poland, the GDR, Hungary and Czechoslovakia for oil products and to develop the production of synthetic materials in these countries in accordance with the recommendations of the X Session of the Council for Economic Mutual Assistance (December, 1958), agreements have been concluded between the Soviet Union and these countries on the construction of an oil main for transporting considerable quantities of oil from the Soviet Union. The route of the oil main will begin in the vicinity of Kuibyshev and stretch West to Mozir (the Belorussian SSR); from here one branch of the oil main will stretch to Poland and the GDR, and another to Czechoslovakia and Hungary. The overall length of this oil main will be about 4.5 thousand kilometers, and its construction is to be completed by 1963. This oil main will make it possible, by 1965, to increase the deliveries of Soviet oil to Poland, the GDR, Czechoslovakia and Hungary by more than 3 times compared to the 1958 figure. The transportation of oil via the oil main will be much cheaper than it costs to ship it by rail today. Thus, the expenditures connected with the transportation of oil to Czechoslovakia will be cut to one-eighth of the present cost.

Each of the countries concerned takes upon itself the construction of the section of the oil main which passes through its territory, and this part of the oil main will be its national property. At the same time, extensive mutual assistance has been envisaged in the form of deliveries of pipes, equipment, special building machines, etc. This project is one of the most important undertakings aimed at the practical implementation of the recommendations of the Council for Economic Mutual Assistance on carrying out extensive specialization and cooperation in the fuel and power industries of the socialis countries.

Another example of the fruitful cooperation of the socialist countries in the sphere of the effective utilization of power resources is the construction of the gas main stretching from Transylvania (Rumania) to the vicinity of Borshod (Hungary). This gas main which is 365 kilometers long was commissioned in 1959. During the construction of this gas main wide use was made of Soviet excavating and pipe-laying machines. The Soviet Union provided pipes for the Hungarian section of the gas main. Two hundred million cubic meters of methane are annually shipped along this gas main, and this gas is used in Hungary by the Tiszapalkonyi Thermal Electric Station which has a capacity of 200 thousand kilowatts, bythe metallurgical plant in Miskolc, as well as in Gyosgyor. After the commissioning of the integrated chemical plant in Tiszapalkonyi, gas will be used first of all for the production of synthetic materials, dyes and artificial fertilizers.

In connection with the considerable increase in the consumption of oil and gas in the economies of the socialist countries, these states are faced with the task of expanding the scope of geological prospecting for oil and gas in districts which have not yet been sufficiently explored for this purpose. The aim of this work is to increase to the maximum their own extraction of oil and gas, parallel with increasing the import of these products.

The assistance of the Soviet Union and Rumania, which have highly developed oil and gas industries as well as oil machinery industries, will play an important role in successfully solving the task of prospecting, extracting and refining oil and gas in the socialist countries. In accordance with the specialization which is now developing, the USSR and Rumania will be able to grant scientific and technical aid to the countries of the socialist camp and to provide their oil-extraction, oil-refining and gas industries with the necessary equipment.

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During the period of the full-scale building of communism in the USSR and the completion of socialist construction in the people's democracies, the international socialist division of labor in the field of electric power engineering assumes special significance for the earliest possible realization of the comprehensive electrification of the socialist countries, as a necessary prerequisite for the gradual equalization of their levels of economic development.

The socialist countries which are industrially more advanced are granting considerable assistance to the fraternal countries in the development of the electric power industry. For example, large-scale electric power construction is under way in China, Rumania, Bulgaria and other socialist countries with the assistance of the Soviet Union. Czechoslovakia, the GDR and Hungary are also delivering equipment and granting technical aid to the fraternal countries in the construction of electric power stations.

The rate of increase in the production of electric power in the socialist countries, and the direction in which their cooperation in this field is developing depend, first and foremost, on the availability of power resources and the volume of production in the various branches of the fuel and power industry.

A shortage of cheap power resources combined with a high rate of growth of electric power consumption is the main reason why some of the European people's democracies cannot fully meet their rapidly growing requirements for electric energy out of their own power resources.

At present, inter-state specialization and cooperation in the sphere of electric power engineering are determined, first of all, by the location of the various types of power resources. That is why the socialist countries have set themselves the task of, first of all, utilizing to the fullest their own cheap power resources for the production of electric power, and using the rich power resources of neighboring socialist countries, granted in accordance with the principles of the international socialist division of labor and on a mutually advantageous basis, only as an additional source of power supply. These neighboring socialist countries may be able to specialize in the production of electric energy in quantitites exceeding their own requirements. At the same time, given the increase in the production of electric energy, the choice of one or another type of power resources must be based on technical and economic calculations which take into account the specific production and transportation conditions of the given area, the construction costs and time necessary for building the electric power stations, the economy of capital expenditures per unit of capacity, and the economy derived from the operation of the electric power stations.

Considerable resources of brown coal, accessible for working by the open-cut method, serve as the basis for the development of the Polish electric power industry which, with corresponding economic assistance from the fraternal countries, will be able to apportion some of its power capacities to meet shortages of electric energy in neighboring socialist countries. Poland will give priority to the construction of thermal electric stations operating on brown coal. According to the estimates of Polish economists, by 1975 the share of various primary sources of energy in the production of electric power will undergo the following changes in Poland (in % of total output of electric energy):

	1955	1960	1965	1970	1975
Coal	95.3	93.3	68.0	49.7	43.1
Brown coal	0.7	4.6	28.4	42.0	44.8
Hydro-power	4.0	2.1	3.6	4.8	6.4
Nuclear power	—	—	—	3.5	5.7

The socialist countries are granting Poland assistance in the development of its electric power industry. Thus, the electric power stations in Iavozhin, Skavin, Turov and other places were built with Soviet aid. The German Democratic Republic is rendering Poland considerable assistance in the construction of the Turov Electric Power Station, the largest in the country. Czechoslovakia is helping Poland to build thermal electric stations and hydroelectric stations. Hungary is supplying Poland with hydrogenerators for the hydroelectric station under construction on the Bug river.

Great possibilities for large-scale power construction exist in Rumania. Large thermal electric stations and hydroelectric stations can be built there with the assistance of the other socialist states. Two thermal electric stations are already being built in Rumania on credits granted by Czechoslovakia. The total output of these stations will be 4 billion kilowatt-hours a year, and half of it will be transmitted to Czechoslovakia.

The participation of the Soviet Union in the international socialist division of labor will expand considerably in the next few years through electric power deliveries from electric stations based on the Lvov-Volinsk coal basin and, later, from stations based on other coal deposits.

An important task in the development of the power industry of the socialist countries is the joint, comprehensive utilization of hydro-resources. At present hydro-economic projects are being drawn up to make use of several rivers rich in hydro-resources. The creation of a system of large hydroelectric stations in addition to the production of considerable quantities of cheap electric power will make it possible to improve the operating conditions of thermal electric stations and entire power grids.

The task of developing atomic power will assume increasing significance in the countries of the socialist camp.

The measures aimed at the unification of the power grids of the member-countries of the Council for Economic Mutual Assistance constitute an important stage in the development of the international socialist division of labor in the field of electric power development. In accordance with the decisions of the XI Session of the Council, the power grids of (a) Poland, the GDR, Czechoslovakia and Hungary, (b) Rumania and Czechoslovakia, (c) Hungary and the USSR, and (d) Poland and the USSR, are being connected by electric-transmission lines with a voltage of 220 kilovolts and higher.

The unification of power grids will create the conditions for the most efficient utilization of power resources and for meeting the shortage of electric energy in individual socialist countries. According to available estimates, the economic effect of the reduction of reserve capacities alone will considerably exceed the capital investments necessary to build the connecting power-transmission lines in these countries.

Another important problem facing the socialist countries is the preparation of a single fuel and power balance, first for the member-countries of the Council for Economic Mutual Assistance and later for all socialist countries. Drawing up such a balance will make it possible to achieve a considerable increase in the effectiveness of the international socialist division of labor in the productio of fuel and electric power; it will also serve to better meet the requirements of individual countries for fuel and electric power.

The consistent realization of the international socialist division of labor in the fuel and power branches within the framework of the entire world socialist economic system plays an important role in strengthening the economic might of the socialist camp.

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M. VILENSKII:

Some Problems of Complete Electrification in the USSR

The current Seven-Year Plan will be a decisive stage in implementing the great Lenin's idea of completely electrifying the country. The exceptional significance of electrification in the creation of the material and technical base for communism demands a theoretical clarification of the question of the nature of complete electrification and the best ways of reaching this goal. Lenin's well-known formula directly points out that communism assumes the complete electrification of the country. Consequently, complete electrification involves, first of all, the introduction of electric power into all the corners, all the branches of the economy of our vast land.

The successful implementation of the GOELRO plan and of the five-year plans has helped to overcome the lag in the electrification of the country, its various parts and regions. At present there are almost no populated districts in the Soviet Union where electric power is not generated and used. Compared to 1913, the total capacity of power generating installations has increased 48 times with respect to the area of the country's territory, reaching a figure of 2.4 kw. per square kilometer in 1958, while the consumption of electric power has gone up nearly 115 times, the present figure being 10,418 kilowatt-hours per square kilometer. However, we cannot say as yet that the task of complete electrification set by Lenin has been fully carried out. In 1958 more than one-hal of all collective farms and 4% of all state farms i many regions of the country were not electrified at a

The main thing, however, is not that some enterprises and settlements in certain parts of the country's territory are not provided with electric power. Although, on the whole, electrification in the Soviet Union has gone through a stage of tremendous growth, the level of electric power development in the individual regions is extremely uneven. Thus, the level of electrification in individual administrative economic districts varies from 0.02 kw. to 80 kw. per square kilometer.

Generating capacity on hand for groups of districts (in kw. per square kilometer)	Number of districts	Relative share of these districts (in %) in:			Average generating capacity of group of districts (in kw. per square kilometer)
		Total capacity of electric stations	Total electric power consumption	Territory of country	
Less than 1	20	6.6	5.9	66.3	0.25
1-3	21	11.3	8.6	15.3	1.74
3-5	17	10.6	9.1	6.2	4.00
5-10	21	21.5	19.6	6.8	7.40
10-20	14	22.5	26.3	3.8	14.12
20-60	8	22.7	24.5	1.5	33.00
Over 60	1	4.8	6.0	0.1	80.53

Such unevenness is partly explained by varying degrees of development of individual territories, by regional differences in the structure of the economy of the districts, and by the predominance in some districts of branches which consume a great deal of power, and in others — of branches which consume little power. However, the main reason for the uneven electric generating capacity among districts is the low level of development of the electric power base in many districts and the shortage of power transmission lines for distribution of the energy in such districts. The level of electrification in such districts does not meet the requirements of modern technology.

The synthetic indices of electrification, such as, for instance, the industrial consumption of electric power per million rubles of output and per worker, or power consumption on farms per hectare of arable land, or consumption for household needs and the municipal economy per city dweller, vary sharply in different districts. A grouping of economic administrative districts according to these indices, linked with the above grouping of these districts with respect to generating capacity, is given in the following table.

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Generating capacity on hand for groups of districts (in kw. per square kilometer)	Number of districts	Electric power consumed in 1958 (in kwh.)			
		In industry			
		Per industrial worker per year	Per million rubles of gross industrial output	In agriculture, per hectare of arable land	In households, per city dweller
Up to 1	20	6,405	115.6	24.1	131.3
1-3	21	6,231	110.3	24.5	125.2
3-5	17	5,250	87.1	12.2	125.9
5-10	21	5,512	84.9	28.9	106.1
10-20	14	12,487	185.6	58.3	141.8
20-60	8	12,447	185.4	65.1	205.0
Over 60	1	13,494	224.9	115.5	155.6

Behind the average indices are hidden still greater variations for separate districts. Thus, electric power consumption per million rubles of gross industrial output fluctuates from 20.6 to 364.9 kwh., per industrial worker — from 1,308 to 31,570 kwh., per hectare of arable land — from 4.2 to 205.8 kwh., and per city dweller — from 57.9 to 375 kwh.

To a certain extent the diversity in the indices of electric power consumption may be attributed to differences in industrial structure. However, since large power-consuming sectors, chiefly aluminum plants, are concentrated only in several economic administrative districts, the influence of this factor on differences in electric power capacity is insignificant. As far as other branches of manufacturing and extracting industries are concerned, differences in the extent of electrification of production processes in various districts cannot be justified by differences in the structure of the economy; the former differences are an indicator of unevenness in the electrification of districts.

Thus, complete electrification, from the point of view of providing the country with electric power, is aimed at equalizing the level of power consumption in the various districts. But this is not simply a mechanical equalization. Certain differences in the electrification levels of the districts are inevitable; but such differences will not stem from the poor development of electric power but rather from the varying structure of the economy, first of all — the varying structure of industry, i.e., from purely regional factors. Therefore, the complete electrification of the country should be understood as the level of electrification of separate parts and districts such that these will receive sufficient amounts of electric power corresponding to the structure of their economy and to the attained level of development of their methods and technology of production.

Complete electrification of the country is most closely associated with the improved location of productive forces and with equalization of the level of economic development in the separate districts. This is one of the most important tasks during the period of building the material and technical base for communism. The concrete levels of electric power consumption in separate districts should be determined only on the basis of a thorough study of the productive forces in each district and by drawing up long-range plans for the economic development of these districts.

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We have dealt with the territorial aspect of the problem of the complete electrification of the country. This is, however, only one side of the problem. Electrification is, above all, the basis of technical progress in all branches of the economy. As emphasized in the resolution of the July (1960) Plenum of the Party Central Committee, the reserves and possibilities for the further acceleration of the rate of technical progress and for enhancing the productivity of labor depend upon the rate of electrification of the country. Such electrification must embrace all the production processe which can be electrified at the given level of development of engineering and technology.

The electrification of industry began with the electrification of power processes. Because of its physical properties, electricity proved to be a better energy carrier in the mechanization of power processes than steam. Employed as a driving forc electricity also ensures higher technical and economic indices of operation of machines and mechanisms. Electric drive frees the production space previously occupied by complex mechanical transmission systems. This increases the reliability and safety of operation of machines and permits a increase in their capacity and speed. Finally, electrification of power processes assures a technical improvement of the electric drive, a shift from the group drive to the individual and multi-motor drives. This is an important factor in the creatio of automated complex machinery, automatic lines, sectors, shops and plants. At present, electrification of operating machines in industry is nearly completed. The proportion of installations using electric drive is 89%.

However, all this does not mean that all power processes in industry have been electrified. The electrification of operating machinery in the different branches of industry is uneven, varying fro 98.1% in machine-building to 78.8% in the food industry. Further, although the level of mechanization of the main processes is high in all industrial branches, the sphere in which heavy physical labo is used is still very extensive. Mechanization in industry has not yet become comprehensive. Manual labor is still employed in numerous types of auxiliary work, above all in the transportation and handling of raw materials, semi-finished and finished goods in the shops and enterprises. Technical inspection of finished products, maintenance and repair of equipment are also largely done by hand.

The 21st Congress of the CPSU has set the task of completing the integrated mechanization of industry during the current Seven-Year Plan. During this period heavy physical labor will be replaced by machinery. And electrification will be the technical basis of this integrated mechanization.

But the full electrification of power processes i industry cannot be considered as completed even after the integrated mechanization has been carried out. Electrification of power processes must reach such a level that man will be only an observer of production processes performed by a system of automated machines controlled and continously checked by means of electronic and telemechanic devices. Only with the completion of integrated automation will the electrification of power processes in industry become an accomplished fact. This task of integrated automation of industry was set by the 21st Congress of the CPSU for the entire period of building the material and technical base for communism and will be carried out.

The electrification of technological processes is the main direction to be followed in bringing electric power to industry. Future technical progress will be ensured by electrical technology. Industries based on electrical technology (electrothermy, electrolysis and electrochemistry) are the ones most prepared for automation. The following factors are associated with electrical technology: progressive changes in the branch structure of industry, increased production of a number of high-quality materials and metals (light metals, rare and dispersed elements) which could not be obtained or could only be obtained with great difficulty by mechanical or thermal working of the respective ores and raw materials. Electrification of technology, particularly when applied to the field of metallurgy, makes it possible to obtain a number of materials of high chemical purity. It is well known that modern electronic and jet-propulsion engineering and its further progress, associated with a great increase in power, speed and other parameters of machines and mechanisms, are based on the extensive use of metals and materials obtained by means of electrical technology. Electrification of thermal processes in ferrous and non-ferrous metallurgy, as well as in the cement and glass industries, increases output and labor productivity, at the same time improving the quality of production as compared to that obtained with the aid of other energy carriers (coal, mazut, gas, etc.). An improvement of working conditions and an intensification of production, an increase in labor productivity, as well as an improvement of output quality in such traditional branches of manufacturing as metal-working, wood-working, and the light and food industries are also connected with electrical technology. The level of electrification of technology, together with the automation of industry, are becoming the most important indices of the industrial development of the country.

The Soviet Union has scored important successes in the electrification of technology in industrial production. However, we are still considerably behind the United States, where the share of such power-consuming branches as aluminum, magnesium, chemicals and atomic power accounted for 53.5% of the total industrial electrical balance in 1956. The lag in the electrification of technology relative to the electrification of power processes is explained by the insufficient development of electric power generation. In contrast to the electrification of power processes, the electrification of technology requires greater amounts of electric energy. Therefore its effectiveness, in comparison with the usual technology, will chiefly depend upon how cheaply electric energy can be produced.

The level of electric energy production in our country cannot yet provide for the complete electrification of technological processes in industry. Electrification of the basic thermochemical processes in ferrous metallurgy (blast-furnace and steel melting production) would require about 40% of the electric power produced in the country in 1959. The process of complete electrification will be fully carried out only when our power generating facilities will be able to provide industry with the necessary amount of cheap electric energy for the realization of all technical possibilities offered by the introduction of electrical technology.

Complete electrification involves the full electrification of one of the heaviest consumers of electric energy — agriculture. Bringing electric power to the farms and fields, into all the phases of agricultural work, is complicated by specific features of the production processes in field-crop cultivation associated with working large tracts of land and requiring mobile means of delivering electric power. Therefore, the first stage of farm electrification pertains only to stationary processes, such as: various types of work in livestock raising, grain thrashing, preparing the grain for industrial use, primary working of technical crops, subsidiary operations, etc. Calculations show that the electrification of these types of work will require about 200 kwh. of electric power per hectare of arable land.

Compared to 1928 electric power consumption on farms has grown nearly 200 times by 1958. However, the electrification of agricultural production is still in its initial stage. Electric power consumption per hectare in collective and state farms was, on the average, only 25 kwh. in 1958. The average figure for collective farms was 17 kwh. Although 42% of electric energy consumed in agriculture goes for household needs, the farmer's every-day life is poorly provided with electricity. By 1957 only 20% of collective farm peasant households in the whole country were electrified.

The most important stage of farm electrification is still ahead: that of bringing electric power to the mobile processes of agricultural production. While continuing to supply our farms with tractors having internal combustion engines (which at present is the chief means of mechanizing field work), while improving the tractor and its economic indices, we must not forget that only electrification will ensure an integrated mechanization of all the processes of agricultural production, including field-crop cultivation, and will pave the way for the automation of all branches of farm work. Since 1948 we have been experimenting with electric tractors and electric harvesting machines in field-crop cultivation. These experiments have yielded good results. Electric tractors have been used in more than 20 types of field work (all types of ploughing and cultivation, harrowing, paring, sowing, etc.). These electric machines turn out work of better quality than that done by tractors with internal combustion engines, resulting in an increase in grain yield of 10%.

The complete electrification of agriculture is a complicated problem, but until it is finally solved the complete electrification of the country cannot be considered accomplished.

An important role belongs to the electrification of railway transport — the heaviest consumer of power. It is well known that the proper choice of the energy carrier and the corresponding transportation equipment affect the economic indices of transport operations to a great degree.

For all the importance which we now attach to diesel locomotives, which are, indeed, an important factor in increasing the economic effectiveness of railway transport, we must recognize that in the future electrified railways will be the chief line of technical progress in this field. Apart from the direct economic advantages derived from electrified railways — particularly those operating on alternating current — we must consider the great role of electric power transmission lines feeding the locomotives, for they will feed the districts adjacent to the railways, too. The railway substations which will supply the Siberian railway trunk with power can also electrify several districts having an area of at least 2 million square kilometers.

In recent years the rate at which transport facilities have been electrified has rapidly increased. In the length of electrified railways and the rate of electrification the Soviet Union holds first place in the world. We are carrying out ahead of schedule the master plan calling for the electrification of 40,000 kilometers of railways.

A most important problem of complete electrification is that of bringing electric power into the municipal economy and into households. This factor is not only of national economic significance but is also of great social importance.

Municipal and household facilities annually consume at least 80 to 90 million tons of conventional fuel (taking into consideration the decentralized fuel storage). In addition, household operations include a large number of labor-consuming operations which are done by hand in most families (washing, cleaning up the house, heating and cooking). According to available data, in a city with a population of one million these duties call for 650 man-hours annually where there is no mechanization of the household work.

Electrification is the only way to achieve a rational consumption of power in the municipal economy and in households, and the only road to the further mechanization of household work. Exceptionally large economies of resources and labor are attained by the electrification of lighting and power processes in the household (washing and house cleaning) and in the municipal economy (mun cipal transport, sewerage and water mains). Electrification must also extend to the high-temperature processes of energy consumption in the household and municipal economy associated with cookin at home and at public catering establishments. However, under modern conditions the electrification of such processes in most districts of the country is economically less effective than gasification or even the utilization of hard and liquid fuels (coal and kerosene). At the same time, from the point of view of quality of cooking and also sanitation and hygiene, electrification is doubtlessly more advantageous. Under conditions of socialism when care of the people's health becomes the affair of the state, the complete electrification of high-temperature household processes should be considered a part of the country's complete electrification. In the future, the electrification of these processes will also yield a considerable economic effect as a result of technical progress in the field of electrical engineering.

As for low-temperature processes of power consumption in the household and municipal economy (comprising mainly heating), we face a somewhat different situation. With the present economic level of electric power generation, the electrification of these processes will not be more economically advantageous than the generation of heat produced in boiler rooms using natural and artificial gas, hard or liquid fuel. Therefore, the replacement of individual heating of buildings by centralized heating, and also hot-water supply from boiler rooms and heat and electric power plants, will prevail for a long time as the main means of rationalizing these processes of household energy consumption. This is particularly true if we consider that centralized steam supply ensured a radical improvement in sanitary conditions and an economy of labor; moreover, such a system is certain to go through further technical improvements. Still, in certain districts of the country, first of all in the districts of the Asiatic North, electric heating of buildings is justified in the interests of labor economy. In particular, such heating is being planned in the city of Mirnyi in the Iakut ASSR.

The social significance of electrification of municipal services and household operations consists in the fact that electric power saves the time required to perform household duties, thereby liberating women from burdensome household work and giving millions of people an opportunity to improve their educational and cultural level. Calculations show that the complete electrification of all power-consuming processes in municipal services and household operations will require about 1,500 kwh. of electric energy per capita per year.

The Soviet Union has already scored great successes in the electrification of the municipal economy and household operations. However, from the point of view of complete electrification of the country, this is only the initial stage. Lighting is most fully electrified. But there are still villages and collective farms that remain without this blessing of modern civilization. Only by the end of the current Seven-Year Plan will all the homes of collective farmers and state farm workers receive electric power.

Such, in general, are the qualitative characteristics of the level of electrification in various branches of the economy, the achievement of which will be tantamount to solving the task of the complete electrification of the country.

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Equipping all industrial and labor processes with the respective implements, mechanisms and apparatus designed to fully utilize the advantages of electric power — this is the technical prerequisite for bringing complete electrification to fruition. The absence of the full complex of electrical implements of labor slows down the electrification of a number of industrial processes. Thus, completing the electrification of power processes in industry is held back because a full set of machines and implements for auxiliary processes and jobs has not yet been built, and also because mechanisms which are already in production are produced in insufficient quantities (hoisting and transport equipment, measuring mechanisms, etc.). The development and production of the most effective means of integrated automation are being held back, technical problems of electrification of thermal processes in metal-working are being solved slowly, and a sufficient output of various equipment for machining work tools by electricity has not yet been attained.

In agriculture the completion of electrification of stationary production processes is being held back not only because reliable electric power supply sources are absent in many localities, but also because there are not sufficient quantities of electric motors of different power ratings and other machinery designed to be driven by electricity.

On railroads, the most advanced system of electrification — the alternating current drive — has not yet been employed to a sufficient extent.

For the electrification of household operations we must increase the production of electrical appliances, improve their design and economic performance, and develop and put on the production line electrified kitchens and economical heating devices.

The material base of complete electrification involves the creation of a corresponding electric power industry. Such an industry faces two main requirements. First, the electric power generation level should not limit complete electrification; it is necessary for the growth rate of electric power generating capacity to be ahead of the growth rates of all other branches of the national economy. Second, the generated electric power should be so inexpensive that the full electrification of production in all branches of the national economy would yield economies of resources and labor, relative to the use of other power carriers.

At the present stage of its development, the Soviet electric power industry still does not meet these two requirements. The rate of electric power development in the USSR is high, but it is only slightly ahead of the growth rate in other branches. In the years of the prewar five-year plans the rate of growth of industrial electric power consumption exceeded by 1.55 times the gross industrial output growth rate. Then, during the following 10 years (from 1940 to 1950), this coefficient dropped to 1.1. In the fifth Five-Year Plan it was 1.01. During the present Seven-Year Plan electric power is growing at a slightly more rapid rate than the growth of industrial production (the coefficient is now 1.22). In the last 20 years (1937 to 1957) in the United States, while industrial production increased 2.34 times, industrial electric power consumption increased 5.29 times, i.e., 2.26 times as fast. This was due to technical retooling of old branches of industry, wide development of new branches based on electrical technology — electrical metallurgy, electrochemistry — and during the last ten years —

on an atomic industry. In the same period the growth rate of Soviet industrial production was much higher than that of the United States: a growth of 5.6 times as compared to 2.3 times. And yet, the growth rate of industrial power consumption in the Soviet Union was only slightly ahead of the American rate.

At present, the problem of increasing the rate of electric power development in the Soviet Union assumes special significance because of the systematic overfulfillment of planned assignments in industry, transport and agriculture. The July (1960) Plenum of the Party Central Committee turned its attention to the slight delay in putting into operation the new electric power generating facilities. Respective instructions were given to the USSR State Planning Committee, the Councils of Ministers of Union Republics, the Ministry of Electric Station Construction, and the economic councils. The instructions called for closer attention to the construction of electric stations, and for the development and rapid organization of production of modern turbines, boilers and electrical machinery. The Plenum's resolution pointed out that overfulfilling the assignments of the Seven-Year Plan in the domain of electric power development strengthens the base of technical progress in all the branches of the national economy.

The development of the Soviet electric power industry is accompanied by a systematic increase in its technical level, a decrease in fuel expenditures per unit of output, a growth in labor productivity and a lowering of production costs of electric energy. The production cost in 1958, as compared to 1950, dropped by nearly 36.4% (in prices of the corresponding years) and was 7.98 kopeks per kilowatt-hour. However, the production cost is still quite high and this makes it economically ineffective to electrify a number of heavy energy-consuming processes. As far as the cost of electric power is concerned, we are still behind the United States.

Fuel consumption exerts a decisive influence upon the production cost of electric power produced by thermal power stations. In 1958, at the district electric stations of the Soviet Union, fuel consumption per unit of output was 56.6% below the figure for 1928 and amounted to 482 grams of conventional fuel per kwh. But this is still 14% higher than fuel consumption at the general-purpose electric stations in the USA. At that, it should be kept in mind that the district electric stations, having comparatively favorable economic indices, electrify the smaller part of the country's territory although they produce the greater part of electric power. The vast territory of the country receives power from isolated stations whose economic indices are very unfavorable. Some stations of this group (rated at 500 kw. and higher) consumed 770 grams of conventional fuel per 1 kilowatt-hour in 1957, while the production cost of the electric power produced by them reached 50 kopeks per kwh. and higher. Electric stations of smaller power than 500 kw. consume more than 1.5 kg. of conventional fuel per kwh. and the production cost of electric energy generated by them exceeds 1 ruble per kwh.

The limited amount of electric power generation relative to the requirements of complete electrification, as well as the inadequate supply of cheap power, require a system of priorities in the electrification of industrial branches and separate processes. In order to industrialize the country as rapidly as possible, top priority in the past was given to the electrification of industry. The main production processes, where electricity is used as the driving force, were the chief ones to be electrified. Technological processes which are heavy energy consumers (thermal processes, etc.) were only slightly electrified. First of all, those electro-technological processes were developed which, by their very nature, could not be based on fuel. In other branches of the national economy top priority in electrification was given to processes which required smaller amounts of electric power and yielded the maximum economic effect; this pertained chiefly to electric lighting and to certain power processes.

As the amount of electric energy produced increases and its cost is reduced, the range of electrified industrial branches and processes will increase. And the complete electrification of the country can be reached, according to available calculations, when from 2,400 to 2,600 billion kilowatt hours of electric energy are generated annually.

The task of complete electrification, just as the whole task of building the material and technical base for communism, is being solved against the background of the fundamental problem of our day, namely, that of the economic competition between the socialist and capitalist economic systems. In this competition, the question of gaining time, of the period necessary for the solution of economic problems, plays an exceptionally important and vital role. The development of electric power engineering must ensure the achievement of complete electrification within the shortest period of time. To attain this, we must solve the most important problem, i.e., the problem of the effective utilization of capital investments. The goal will be reached by reducing expenditures per kilowatt of power as much as possible.

The requirements which electric power

engineering must meet in connection with complete electrification determine the main lines of its development. These lines are: 1) concentration of power generating facilities, 2) centralization of power supply and 3) utilization of the cheapest sources of energy for the production of electric power. In contrast to the other branches of heavy industry, electric power engineering has only quite recently availed itself of the technical possibilities and economic advantages of concentrated production. This is explained by a number of its peculiarities, particularly by the fact that generation and consumption of electric power coincide in time. As long as the problem of transmitting electric energy over considerable distances was not solved, the electric station was tied to its consumer and its power was determined by his requirements. But the electric power consumption of even the largest plants of heavy industry is comparatively small.

Great achievements in the technology of electric power transmission during the last 20 to 30 years have created the conditions for the full utilization of the possibilities offered by the concentration of power-generating facilities. Such concentration, sharply cutting capital investments required per unit of output, increases the rate of electric power development and shortens the time necessary for the achievement of complete electrification.

The time which can be gained in completing full electrification by the concentration of power-generating facilities is reflected in the following table which shows capital investments required in electric stations as they are enlarged.

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Capacity of electric stations (in thousands of kilowatts)	Number of turbines	Turbine unit capacity (in thousands of kilowatts)	Capital investments (in rubles per installed kilowatt of capacity
100	2	50	1,408
300	3	100	1,170
600	3	200	925
1,200	4	300	850
1,800	3	600	655
2,400	4	600	620

Concentration of power-generating facilities is the most important way of decreasing the cost of electric power production and of reaching the level at which complete electrification of all branches and processes of production becomes economically effective (see the following table).

Such concentration improves all the economic indices of electric station operation. But the degree of this improvement depends upon the path along which concentration proceeds. We know that the power of separate electric stations can be increased either by increasing the number of electric generators similar in capacity and parameters, or by using higher-capacity generators with increased parameters.

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Capacity of electric stations (in thousands of kilowatts)	Fuel consumption (in grams per kilowatt-hour of conventional fuel)	Staff coefficient (men per 1,000 kilowatts of capacity
100	450	5.40
300	372	2.06
600	361	0.85
1,200	331	0.48
1,800	324	0.36
2,400	324	0.30

The second path of concentration is much more effective: the economy on capital investments here is from 2 to 3 times higher (as compared to that derived from increasing the number of generators of average capacity), and the production cost of electric energy is nearly halved. Boosting the capacity of electric stations by multiplying the number of similar generators with identical parameters does not yield fuel economy; in this case the production cost of each kilowatt-hour is reduced because of the growth of labor productivity (a smaller staff coefficient) and a decrease in the share of depreciation in production costs. At the same time, an increase in the capacity of individual generators yields better indices of growth of labor productivity and reductions in capital investments. This results in better indices of production costs as compared to the case when the number of similar average-power generators is increased. Concentration carried out on the basis of increasing the unit capacity and parameters of generators is the leading method of electric power development.

The economic advantages derived from concentration may be successfully realized in the attainment of complete electrification, providing such electrification is accompanied by a centralization of electric power supply.

The power of modern electric stations exceeds by many times the power requirements of the largest industrial consumers. Moreover, even the electrification of each economic administrative district from its own powerful and super-powerful electric stations is impossible, for there is not a sufficient demand for electricity in most districts to justify the operation of such stations.

Tentative computations show that supplying a district from a district electric station with a capacity of 1,200 kw., instead of using 12 local 100-kw. stations for the purpose, yields an economy of capital investments sufficient to erect 2,400 kilometers of a distribution electric network. In addition, the economy gained on the electric power production costs in such an arrangement more than covers the transmission expenses, including the electric power loss in the network. Technical progress in building high-power generators and in the transmission of electric energy has made it economically effective to create electric power systems of various types, up to and including a single power grid for the country, and to organize the electric power supply for large districts from such systems. As we know, a great deal of work has been done in our country to create a single power grid in the European part of the USSR and to develop electric power systems in Western Siberia, Central Asia and the Transcaucasus. The Soviet Union now possesses the world's most powerful electric power transmission lines, operating at voltages reaching 500,000 volts.

The creation of such systems promotes the further intensification of concentration and improves the electric energy economic indices. It is known that in an isolated district system the unit capacity of a generating set must not exceed the magnitude of the breakdown and repair reserve, i.e., approximately 8 to 10% of the capacity of the whole system. Installation of larger generating sets would require an increase in this reserve, which is economically disadvantageous. When we consider that in the USSR, until recently, low-power district systems were prevalent, it is easy to see why the introduction of the more economical 100 and 200 thousand kw. generating sets was not justified. As a matter of fact, this hindered technical progress in the development of electric energy. The creation of single electric power grids in the European part of the country and in Central Siberia (with capacities of tens of millions of kilowatts each), makes it possible to install generating sets of any unit capacity at the electric stations and to take full economic advantage of concentration.

In addition, setting up large, combined electric power systems and, finally, a grid for the whole country, will yield a great economy of power because of such factors as the coincidence of district and consumer peak electric loads combined into the same transmission network, and the formation of a common repair and breakdown reserve. Calculations show that district electrification of the European part of the country from a combined system network, in comparison to separately operating systems, will save 4.4 million kw. of capacity. The possibility of free maneuvering of capacity in such a system creates the most favorable operating conditions for hydroelectric and thermal power stations. This will lower power-generating expenses in the system as a whole, and also will make it possible to fully utilize the river energy in various districts with the aid of compensated regulation. The economy derived from the creation of combined systems will make it possible to recoup capital expenditures on the trunk and distributive electric power transmission lines in a short time. The additional capital investments necessary for setting up the combined electric power system of the European part of the USSR will be recouped in approximately five years. The branch network of electric power transmission lines of the combined power systems will serve as a most important prerequisite for the attainment of complete electrification. Electric energy transmission from districts rich in energy resources to districts having no such resources will provide the possibility of supplying electric power to various branches of the national economy in amounts necessary for the completion of all-round electrification.

Grouping of Economic Administrative Districts According to the Level of Centralization of Power Supply (1957)

Relative share of centralized power supply	Number of districts	Relative share of district power-generating facilities in country's facilities		Relative share of small and very small electric stations in power-generating facilities of districts		Relative share of district group in country's territory	Relative share of district group in population
		with respect to capacity of electric stations	with respect to electric power output	with respect to capacity	with respect to output		
Up to 25	31	8.6	5.9	70.2	55.7	43.0	17.0
25-50	7	3.3	2.4	50.2	34.1	20.2	5.6
50-75	23	22.3	17.8	39.7	24.6	25.0	31.1
75-86	7	3.9	3.2	35.2	18.4	2.1	6.3
86 and over	36	61.9	70.7	11.3	5.1	9.7	40.0

In 1957 about 64% of the electric energy produced in the country was generated by electric stations with a capacity of 100,000 kilowatts and higher. During the last seven years the output of these stations has increased by almost 3.5 times, and their relative share — by nearly 1.5 times. In this group an important place is held by thermal power stations with capacities of 200, 300 and 600 thousand kilowatts. Hydroelectric plants with capacities of over one million kilowatts (the Lenin Hydro-Power Plant on the Volga and the Stalingrad Plant) also belong to this group.

In 1959 more than 87% of electric power was produced by electric stations united in systems. The centralization coefficient is increasing from year to year. However, at the same time a large number of districts with vast territories are still supplied with electric power from small isolated electric stations.

The electrical machinery industry, while producing 100, 150 and 200 thousand-kw. turbines, continues to manufacture large quantities of low-power generating sets. During 12 postwar years (1946 to 1957), 3,767 steam turbines were produced with a total capacity of 31,383,000 kw., the average capacity of one turbine being 8,000 kw.

The number and capacity of midget electric stations (under 500 kw.) also continues to grow. The construction of these stations still continues not only in remote, sparsely populated districts where such stations are the only means of electric power development, but also in districts in which electric power systems with modern generating stations are functioning. While in 1950 these midget stations accounted for the output of 3.4 billion kwh. of electric energy, the figure jumped to 7.2 billion kwh. in 1957. The power and the output of stations rated under 10,000 kilowatts is also continuing to grow. As a result, the average capacity of one thermal power station in the country was only 330 kw. in 1957. To show how vast is the range of the concentration level of various categories of electric stations, we may note that the average capacity of a thermal power station operating in electric power systems was equal to 95,000 kilowatts in the same year. In the country as a whole, the number of electric stations (not including the district stations) serving industrial enterprises in different branches of the national economy has grown by 62.6% during the last six years (1953-1958), the capacity of these stations having increased by 45.5%. In the same period, the average capacity of these stations has decreased by 22% and equals only 198 kw.

The construction of midget electric stations for farms has been particularly intensified. Between 1950 and 1957 their number has increased by almost 40 thousand, reaching a figure of 64 thousand. The capacity of these stations has grown by 1,863.5 thousand kw., reaching 2.6 million kw. The average capacity of farm stations is decreasing; in 1955 it was 46 kw. while in 1957 it was 41 kw. The average capacity of the stations built in 1955-1957 amounted to only 33 kw.

Until recently the construction of small electric stations was required by objective circumstances. In particular, the level of generation and transmission of electric power did not permit a high degree of concentration and centralization. At present the construction of small electric stations should not be encouraged, as a rule. It is now possible to electrify 80% of collective and state farms from the electric power supply systems. Any attempt to justify further construction of small electric stations on the grounds of would-be difficulties of financial and material resources, and the impossibility of allocating the necessary funds for the erection of large electric stations and networks will not stand criticism. The funds spent on the construction of small electric stations are sufficient for the erection of modern large electric plants several times greater in capacity. According to available data, each kilowatt of installed capacity at small stations costs from 4 to 6 thousand rubles; this is from 6 to 8 times more than in the case of large stations. If we consider that the coefficient of utilization of capacity is 2.5-3 times lower in small electric stations, it is clear that capital expenditures at such stations will be approximately 15 times as great as at the large stations, computed on the basis of each kilowatt-hour.

The main reason for the continued construction of small electric stations is as follows: Until recently the construction of electric transmission lines has not been allocated sufficient funds (12.6% of total capital investments for electric power development in 1952 to 1958), and the development of power transmission facilities greatly lagged behind the rate at which new stations were put into operation. At the same time — as shown by tentative calculations — in the years 1955 to 1957 alone, over three billion rubles were spent on the construction of 23,000 rural stations having a total capacity of 752,000 kilowatts. If these funds had been spent more wisely it would have been possible to put into operation the same amount of capacity at district electric stations and, in addition, to build at least 40,000 kilometers of power transmission lines supplying the farms with electricity.

If the old policy is to be continued and we are to continue allocating about 30% of all electric power capital investments to the construction of small power stations, we shall face a delay in the completion of all-round electrification in many districts, especially in such branches as agriculture, municipal services and household facilities. The extremely expensive electric power generated by small electric stations will completely block the road to the electrification of certain production processes.

The trend in rural electrification toward buildin larger inter-collective farm electric stations and the creation of district systems by their unification do not appear justified to us. In 1957 the average capacity of an inter-collective farm electric station was 180 kw. The economic indices of such an electric station are not much better than those of a small collective farm station. It would be much wiser to use the funds spent on the construction of inter-collective farm stations for the erection of inter-collective farm transmission lines and substations, connecting them to networks of state electric power systems or to large electric stations of industrial establishments and cities

One of the reasons for building small electric stations is the absence of unified organizational, economic and technical leadership in the field of electric power development in the economic administrative districts. In most districts the electric stations are dispersed among economic councils, ministries of communal economy, railways and agricultural authorities. Moreover, even withi the economic councils not all the electric stations are combined in a specialized power administration, many of the stations remaining under the control of separate industrial establishments or branch departments of the economic council. Because of this, the problems of electric power suppl are dealt with from a departmental point of view, without considering the district economy as a whole. The existence in the districts of various electric stations belonging to different department (industrial, communal, transportation and agricultural) is a reflection of the past, when due to a low technical level, the facilities for generation and transmission of electric power were attached to separate consumers. Under modern conditions such departmental barriers become an obstacle to the development of electric power.

The cost of electric energy depends not only on the technical level of electric stations but also on how economically energy resources are used. Th significance of this is seen from the fact that fuel expenditures constitute as much as 60% of the production costs of electric power generation. Hence the utilization of the cheapest kind of energy resources is the most important policy to follow in the development of electric power for the whole period of completion of all-round electrification.

We know that hydroelectric stations produce the cheapest electric energy. But here we have to consider the extended periods necessary for their erection and also the high capital investments required for hydroelectric facilities. Between 1952 and 1958 investments per unit of output in the hydroelectric stations were 4.7 times higher than in the condensation thermal power stations. Further technical improvements of hydroturbines, whose efficiency has already reached a ceiling of 88 to 94%, will not materially reduce capital expenditures, especially if we consider that the turbine is the least capital-consuming element of the hydroelectric station. Technical progress in building operations can considerably lower expenditures in the more capital-consuming elements such as the dam and water reservoirs. Yet on the whole, the capital requirements of hydroelectric stations will remain high.

The priority construction of high-power and super-high-power thermal power stations and the use in these stations of the cheapest kinds of fuel (natural gas, mazut and coal obtained by the open-cut method), will permit us to produce electric power almost as cheaply and with lower capital investments than in the case of hydroelectric stations.

The attempts of certain economists to prove that progressive methods of construction will equalize capital investments per unit of output in hydroelectric and thermal power stations are not based on facts. It should be kept in mind that the possibilities of technical progress in thermal power stations are practically unlimited; this is where huge reserves for the further reduction of capital investments are hidden. Utilization of liquid fuel and natural gas cuts capital investments per unit of output in thermal power stations by 20 to 28% and shortens the period necessary for their erection to six months. Progressive methods of construction will be successfully employed not only in hydroelectric station construction but also, and to no less a degree, in the building of thermal power stations. The amount of assembly–on-the-spot work at thermal power stations will reach from 90 to 95% of the total construction labor. For the hydroelectric stations the figure will be 70 to 80%. In addition, in southern parts of the country the building of outdoor thermal power stations will be undertaken. In moderate zones we will have the erection of "semi-outdoor" thermal stations. During the current Seven-Year Plan capital investments in the condensation thermal power stations will be reduced to 860 rubles per kilowatt. If capital investments in hydroelectric stations are halved, they will still exceed by nearly three times the investments per kilowatt in thermal power stations. At the same time, a sharp increase of labor productivity and a decrease in fuel expenditures at thermal power stations, plus the utilization of the cheapest types of fuel, will bring production costs of electric power generated by these stations to nearly the same level as production costs of power generated by hydroelectric stations.

Thus, priority to the construction of thermal power stations using the cheapest kind of fuel is the road which electric power development must travel to successfully ensure the complete electrification of the country within the shortest period of time. Of course, electric power generated by thermal power installations is not being counterposed to that generated by hydroelectric stations; the most effective examples of the latter will be built.

The temporarily uneconomical level of electric power generation hinders the electrification of a number of power-consuming processes in industry. This stems, to a considerable degree, from the fact that we have an unfavorable structure of the fuel balance at electric stations. In 1955 the share of coal, as a fuel, was 73.7%; natural gas -- only 2%; petroleum products (mazut and diesel fuel) — 9.4%. At that, the major role in the fuel balance was played by the least economical coal. In 1955, in district electric stations alone, 38% of the electric power was produced using the coal mined in the Donbas and in the vicinity of Moscow. The cost of mining this coal is from 7 to 13 times as high (respectively) as the cost of Irsha-Borodinsk coal in the Krasnoiarsk Territory. Only after the 20th Party Congress, which pointed out the road to a radical change in the structure of the country's fuel balance, did the utilization of economical types of fuel at electric stations increase. In 1958 the share of natural gas went up to 10.7%, that of mazut — to 5.9%, while the share of coal decreased to 69.9%. However, in this respect we still lag behind the USA, where in 1957 thermal power stations operating on mazut produced 8.2% of the total electric power in the country, and where the share of natural gas in the process was 22.4%. In 1965 we shall approach the present American level in the utilization of gas and mazut for the generation of electric power. By that time the share of gas in the Soviet Union will be 17.2% and that of mazut — 12.3%.

Investigation and implementation of the most effective and rapid ways of completing all-round electrification are among the most important national economic problems. The successful solution of these problems calls for the full utilization of all the latest achievements of science and engineering in the domain of electric energy production and consumption. Playing a leading role in the technical progress of the entire national economy, the electric power industry must itself be based on the latest and most effective technology. The further concentration of electric power production and the

(CONTINUED ON PAGE 65)

ECONOMIC RELATIONS WITH UNDERDEVELOPED COUNTRIES

Vneshniaia Torgovlia, No. 12, 196

V. BALASHOV AND A. SHCHEGOLEV:

Soviet Equipment on the Markets of Underdeveloped Countries

In the postwar period, particularly in recent years, many of the underdeveloped countries which had won their independence embarked on a policy of establishing extensive economic relations with the Soviet Union. This can be easily understood, for they see that the USSR uses foreign trade and other forms of economic cooperation with industrially underdeveloped countries for the purpose of providing them with effective aid in setting up their own independent national economies. In contrast, the imperialist powers are attempting to use foreign trade to hinder the development of independent economies in the countries of Asia, Africa and Latin America, to prolong the economic dependence of countries in these areas on the industrially developed capitalist powers.

Because of the mighty and varied industry built by the Soviet Union, the rapid growth of its national economy, its great achievements in developing science and technology, vast opportunities have appeared for expanding Soviet exports of equipment, machinery and instruments, of granting economic aid to the countries of Asia, Africa and Latin America which are in acute need of these goods.

In his talk with American journalists, N. S. Khrushchev said the following about the sale of machinery and equipment to underdeveloped countries: "We do so not because we need to export machines, but because some countries ask us to assist them in their economic development. They cannot get such machines from the United States or Britain, who do not want to trade with them on a mutually profitable commercial basis. But we base our relations with all countries on mutual advantage, without attaching any political strings. In selling our goods to these countries we are not prompted by the profit motive. We try to meet the needs of the peoples of these countries. We export equipment mainly to friendly countries, to nations which have freed themselves from colonial dependence." (1)

The Soviet Union looks with great sympathy and understanding at the underdeveloped countries' efforts to set up their own industry; it readily shares with them its experience, grants them technical assistance and material aid by delivering sets of equipment for enterprises under construction.

The share of underdeveloped countries in Soviet machinery and equipment exports grows with ever passing year. The number of countries purchasin the output of the Soviet machine-building industry is steadily growing. In 1959 Soviet machinery and equipment were supplied to more than 20 underdeveloped countries. The main importers of these goods in 1959 were India (34% of all Soviet exports of machinery and equipment to underdeveloped countries), the UAR (22%), Afghanistan (14%), and Iraq (11%).

Deliveries of Soviet machinery and equipment carried out by Soviet foreign trade organizations on usual commercial terms are playing a great role in the development of the national economies of the underdeveloped countries.

In the past two years more than 75% of the exports of machinery and equipment to capitalist countries (carried out by these organizations) wen to economically underdeveloped countries.

Volume of Exports of Soviet Machinery and Equipme
(Excluding Sets of Equipment for Complete Enterprises) to Capitalist Countries
(in millions of rubles)

	1956-1957	1958-1959
Total	327.3	438.1
Including:		
Southeast Asian countries	48.4	102.6
Countries of the Near and Middle East and Africa	155.4	217.6
Latin America	4.7	24.5
Other capitalist countries	118.8	93.4

The list of Soviet equipment exported to underdeveloped countries is growing every year. The main types of machinery and equipment supplied by the Soviet Union to these countries include: tractors and agricultural machines, road building machines (bulldozers, scrapers, and rollers), oil-drilling equipment, motor cars and lorries, metal-cutting machine tools, light industry equipment, transport and hoisting equipment, excavators, electric motors, diesel electric power stations, pumps, ore-milling equipment, and bearings.

The successful export of machinery and equipment to these countries is helped by the constantly rising technical and economic standards of the machinery and equipment manufactured in the USSR. Soviet enterprises take into account the climatic and soil conditions of the underdeveloped countries (for instance, their hot and humid climate, rocky soil, etc.) and produce machinery and equipment adapted for work in the climatic conditions of the corresponding countries. In the process of production they use protective coatings, rust-proof insulation and construction materials, effective ventilation devices, air-tight casings for the most important units of machines and machine tools.

Machinery and equipment are usually included in the lists of Soviet export goods when government trade agreements with underdeveloped countries are signed.

The sale of machinery and equipment to underdeveloped countries is carried out by Soviet foreign trade organizations according to established practices of international trade in these goods. This is done mainly through local agencies and intermediaries which engage in trade chiefly on a commission basis. Sometimes equipment is supplied directly to state organizations and individual consumers.

In most of the underdeveloped countries government organizations make a practice of purchasing equipment and machinery at auctions in which foreign suppliers are invited to take part. Soviet foreign trade organizations have already acquired a certain amount of experience by participating in auctions both through agent firms and directly. In this way we have sold steam boilers to India, printing equipment, drilling machines, excavators, diesel generators, auto-loaders, metal-cutting machine tools to the UAR, excavators to Iraq, and so on.

In recent years the Soviet organizations exporting machinery and equipment have considerably expanded their contacts with agent firms and increased their work with them. At present, they employ the services of more than 140 agent firms in 23 underdeveloped countries. In most of the cases such firms specialize in sales of definite types of machines and equipment and have a sufficiently good knowledge of the local market and of the methods and forms of trade in these goods.

In addition to acting as agents of Soviet foreign trade organizations in the sale of Soviet machines and equipment, these firms at the same time organize locally the necessary technical service and supply of spare parts for the machines and equipment sold through them. (2)

Here are some examples of sales organization and technical servicing of Soviet machinery and equipment conducted through the agent firms connected with the V/O Avtoexport organization.

V/O Avtoexport sells tractors in the Egyptian area of the UAR through its agent firm, Saad El-Agizi. This firm has its own sub-agents in the towns of Tanta, El Mansura, El Minya, Luksor, Asyut, the centers of the country's main agricultural areas. For the repair of tractors supplied by V/O Avtoexport, the Saad El-Agizi firm uses its technical base in Alexandria and some workshops belonging to other firms. Some of the firm's sub-agents also have their own workshops. With the aid of Soviet specialists the firm has trained a group of mechanics capable of carrying on independently the maintenance of the machines and making necessary repairs. At present, the Saad El-Agizi firm is organizing a training center at the agricultural department of Cairo University. At the center lectures will be delivered for trainee-specialists who will also receive practical training in the operation of Soviet tractors. Special groups in the department will train mechanics for the firm and its sub-agents.

In order to ensure the technical servicing of GAZ-69 lorries sold to Indonesia, V/O Avtoexport supplied Indonesian organizations with repair workshops and the necessary quantity of spare parts. When shipments began, this foreign trade organization dispatched to Indonesia eight specialists of the Ulianovsk and Gorkiy automobile plants who delivered the lorries to the buyer, made certain that they were in good repair, and trained about 150 Indonesian specialists at specially organized courses in methods of operation and repair of Soviet lorries.

For the purpose of improving the technical maintenance of GAZ-69 lorries sold to Afghanistan, V/O Avtoexport supplied the Afghan organizations with a considerable quantity of repair and garage equipment. At the end of 1959 an understanding was reached with local firms in the cities of Kabul and Mazari-Sharif on organizing special centers for the technical servicing of Soviet lorries and automobiles and for ensuring their repair.

For the purposes of encouraging the development of domestic national industry and saving foreign currency, the governments of some countries have begun the importation of automobiles, tractors and other machines in an unassembled or semi-assembled form. During 1959-1960 V/O Avtoexport conducted negotiations with the firms of some countries concerning the assembly of Soviet tractors on the spot. For instance, negotiations are now in progress with Indian firms about organizing the assembly of MTZ-5 tractors in India.

In a number of countries the import of many machines and equipment is permitted only after they have been officially tested under local conditions. Good performances at such tests have been recorded by Soviet DT-14, DT-20 and Belorus tractors in India, the UAR, Greece and Morocco; equally good performances have been given by Soviet road-building machines in Indonesia, Soviet television sets in Iraq and Lebanon, and so on. At present the Ministry of Agriculture of Pakistan is receiving a consignment of Soviet MTZ-5 and T-28 wheel tractors and a DT-54 caterpillar tractor for testing in land-development areas.

In order to demonstrate the performance of Soviet machines and equipment unknown on the markets of certain countries, and to familiarize the buyers with them, some of the agent firms temporarily place various models of their stock of machines and equipment at the disposal of buyers free of charge for trial. After a successful trial operation of these samples many of the buyers become permanent purchasers of Soviet machinery and equipment.

The successful sales of Soviet machines and equipment testify to their high quality and to the interest displayed by the underdeveloped countries in importing these goods from the USSR. In exporting Soviet machines and equipment Soviet foreign trade organizations try to satisfy to the greatest possible extent the requirements of foreign firms and government organizations. As a rule, the countries purchasing Soviet equipment are provided with an opportunity to cover the costs of this equipment by deliveries to the Soviet Union of goods which they need to sell.

Considerable quantities of Soviet machines and equipment are supplied to the United Arab Republic. Deliveries of these goods to the UAR (not counting sets of equipment for complete enterprises) in 1958-1959 reached a sum of about 195 million rubles. Payments for exports of equipment are usually made in installments. The greatest share in deliveries of machines and equipment to the UAR are accounted for by road-building machines, tractors, agricultural machines, lorries and cars, excavators, printing, transport-and-hoisting, power-industry and textile equipment. Metal-cutting machine tools and instruments are now also beginning to occupy a substantial place in exports.

In the past two years UAR firms and organizations have purchased in the Soviet Union about 110 tractors of different models for the needs of agriculture. The most popular among these are the MTZ-5 wheel tractors. These tractors have earne a very good name for themselves, working in the conditions of the Egyptian area of the UAR. One can see these tractors on the fields in different parts of the country. Successful use is being made at UAR construction projects of Soviet petrol-engine and diesel lorries with capacities of ten ton and more. Soviet Moskvich-407 and Volga cars, whose first consignments (totalling about 1,500 ca arrived in the UAR two years ago, have become ve popular in the country.

Some of the textile mills in the cities of Alexandria and Aleppo are equipped with Soviet textile machines. A characteristic feature here is that th cost of the Soviet equipment installed in the textil mills at Aleppo was covered by deliveries to the USSR of cotton yarn produced at these mills.

The machinery and equipment purchased from the Soviet Union by India includes a long list of items. For instance, in 1959 India imported Sovie tractors, road-building machines, metal-cutting machine tools, and ball-bearings. Soviet foreign trade organizations also supplied India with drilling and geophysical equipment, with the help of which Indian geologists, working jointly with Sovie specialists, are now successfully carrying on oil and gas prospecting operations.

Exports of Soviet machinery and equipment to Iraq began in 1959 and reached the sum of about 5 million rubles that year. One of the favorable fac tors in the expansion of exports of machinery and equipment to Iraq was the trade agreement concluded between the USSR and Iraq in October 195 In the first year of the operation of this trade agr ment we already supplied Iraq with considerable quantities of automobiles, agricultural machines, building and power equipment, excavators, television sets and various instruments.

There is every reason to assume that in the ve near future exports of other equipment to Iraq wi increase considerably.

Of late there has been an expansion in the expo of Soviet machines and equipment to Indonesia. T Republic of Indonesia needs a great variety of equ ment and machinery to carry out its program of construction of industrial enterprises and public utility installations. These requirements for machinery are met in great measure by imports fro the USSR. In the last two years the Soviet Union h supplied Indonesia with about 75 million rubles worth of machinery and equipment. Most of this machinery and equipment is exported by the Soviet organizations on a long-term credit basis.

Before shipment to Indonesia many Soviet machines and much of the equipment were tested in difficult operating conditions and approved by Indonesian agencies. The Soviet Union was visited by Indonesian experts, who were given an opportunity to become acquainted with the enterprises producing equipment for export, and with the performance of this equipment under different operating conditions.

Soviet machinery and equipment have long been known on the Afghan market. Export of these goods to Afghanistan is usually covered by trade agreements. The list of Soviet goods to be sent to Afghanistan according to an agreement on the volume of trade for 1960 includes machinery and equipment valued at more than 8 million rubles. Lorries and cars have an important place in our deliveries to Afghanistan. Afghanistan also purchases agricultural machines, road-building, hoisting-and-transport and power equipment from us. For the buyers' convenience extensive use is being made of consignment deliveries of equipment, with subsequent sale directly to the buyers. There is a permanent contingent of specialists from Soviet enterprises staying in Afghanistan and they are giving great practical aid in adjusting, assembling and operating Soviet machines and equipment.

In recent years, commercial and industrial circles in Turkey and Iran have been displaying an interest in importing equipment and machinery from the Soviet Union in exchange for raw materials and foodstuffs. Soviet-made machinery and equipment have been well known in both countries for several decades. The Soviet Union supplies Turkey and Iran with automobiles, tractors, agricultural machines, textile machines, electrical equipment and metal-cutting machine tools. In 1959 Soviet exports of machinery and equipment to Iran reached 8.5 million rubles, and to Turkey — 16 million rubles.

In accordance with trade agreements concluded with the Soviet Union, Burma and Cambodia are purchasing electric equipment, automobiles, building and power-industry equipment, and pumps. Although the total volume of Soviet exports of machinery and equipment to Cambodia and Burma is not very great so far (it amounted to only two million rubles in 1959), it is tending to increase.

A beginning has been made in the export of Soviet equipment to Pakistan and Ceylon. The year 1959 saw the first considerable sales of machinery and equipment to Pakistan. Business circles in Ceylon were provided with an opportunity of becoming acquainted with Soviet machinery at a Soviet Exhibition held in Colombo in October-November 1959. Soviet foreign trade organizations have supplied sample consignments of machinery and equipment to Ceylonese firms and organizations.

Conditions are now favorable for the successful development of trade in machinery and equipment with other underdeveloped countries. Such countries of Africa as Morocco, Tunisia, Ethiopia, Guinea, Ghana and Sudan are showing great interest in Soviet machinery and equipment. In their efforts to develop their national economies they place great hopes on Soviet aid. The trade agreements concluded by the USSR with a number of African countries provide for the export of Soviet machinery and equipment. Soviet foreign trade organizations have conducted negotiations with government organizations and private firms in these countries, signed contracts with them, and are already supplying them with consignments of machinery and equipment. Soviet automobiles, road-building machines, tractors, oil-drilling equipment and metal-cutting machine tools can now be increasingly seen in African countries. The supply of machinery and equipment to Guinea in the first six months of 1960, for instance, exceeded the sum of 3 million rubles.

The export of machinery and equipment to Latin American countries developed very slowly until recently. But in 1959 a noticeable expansion occurred in trade in these goods.

Argentina is the largest buyer of Soviet machinery and equipment among Latin American countries. This is accounted for in great measure by the long-term Soviet loan of 400 million rubles granted in 1958 to Argentina on favorable conditions for the purchase of oil machinery and other equipment. Out of this loan Argentina's state organizations have purchased from Soviet foreign trade organizations 200 million rubles worth of equipment. A considerable part of it has already been shipped to that country. The equipment purchased by Argentina for the development of its oil industry includes power-drilling machines, donkey pumps, turbo-drills, boring bits, pumps and seismic stations.

Mexico is now becoming a fairly large buyer of Soviet machinery and equipment. During 1958-1959 Mexican firms purchased metal-cutting machine tools, tractors, agricultural machines, power, printing and other equipment from the Soviet Union. In exchange for this equipment and machinery Mexico supplies the Soviet Union with cotton, tinned fruit and other agricultural products.

At the end of 1959 a trade agreement was concluded between the Soviet Union and Brazil, an agreement providing for the supply to Brazil of Soviet machinery and equipment and of some other goods in exchange for Brazilian products. The profitability of such trade for Brazil is apparent, for it is now having difficulties in exporting some of its goods, particularly coffee. There is every reason to suppose that all the deliveries contemplated by the agreement will be carried out.

The first trade agreement between the USSR and Cuba was concluded in February 1960. This agreement provides for the export of great numbers of Soviet machines and equipment in exchange for Cuban sugar and other goods. Cuba's government organizations are keenly interested in receiving Soviet machines and equipment, and they have already purchased considerable numbers of tractors, automobiles, agricultural machines, electro-technical and power-industry equipment, helicopters, etc. The mutually profitable economic and trade relations which have developed between the USSR and Cuba make it reasonable to assume that machinery and equipment will constitute a most promising and steady part of Soviet exports to Cuba.

The successful export of Soviet machines and equipment to underdeveloped countries is promoted in great measure by the Soviet Union's participation in international fairs and exhibitions.

The visitors to Soviet pavilions at these fairs and exhibitions are provided with the opportunity of becoming familiar with the machines, equipment, instruments and tools exported by the Soviet Union, of seeing how they operate, getting advice from Soviet specialists, becoming acquainted with the terms of sale of equipment and machines from the USSR and even buying them if they wish to. Soviet foreign trade organizations conduct active commercial activity at the fairs and exhibitions and conclude contracts for the sale of exhibits and similar machines and equipment with delivery from the Soviet Union.

The many-sided work of familiarizing buyers with Soviet machinery and equipment is also being carried on through the press, radio, films, permanent demonstration halls, etc.

For instance, showings of films are arranged fo representatives of government organizations, Chambers of Commerce and major companies and firm by Soviet trade missions in the corresponding cou tries.

Demonstration halls of Soviet machinery and equipment have been set up by the Soviet trade missions in India, Afghanistan, Pakistan, Burma, Indonesia and Ceylon. The exhibits in these halls are selected with a view to the requirements of the market in the corresponding country. Demonstration halls are serviced by Soviet industrial expert who familiarize buyers with the exhibited machines, equipment, and instruments, and demonstrate how they operate.

The demonstration and advertisement of Soviet machinery and equipment are also carried out by agent firms of the Soviet foreign trade organizations in accordance with concluded agreements. In addition to displays of machinery and equipment in specially organized demonstration halls, consignment warehouses, shops and local exhibitions, agent firms show short-reel color films received from Soviet foreign trade organizations for the pu pose of advertisement, films about such machiner and equipment as motor cars (the Moskvich-407, Volga, GAZ-69), road-building machines, excavators, metal-cutting machine tools and other items

The export of machinery and equipment to underdeveloped countries conducted by the Soviet Union on an increasing scale and on mutually profitable terms — primarily on a barter basis in traditiona goods — is helping these countries to set up their own industries, develop their national economies, and is strengthening peace and friendship among n tions.

Footnotes

(1) *Mezhdunarodnaia Zhizn*, 1958, No. 5, p. 7.

(2) This matter is discussed in greater detail i the article by B. Gordeev in this issue of *Sovetskaia Torgovlia*, "Improving Technical Servicing o Soviet Equipment Abroad."

REVIEWS

Vestnik Statistiki, No. 9, 1960

D. IAKUSHKIN:

Soviet Agriculture's Sharp Advance *

Agriculture is a vital branch of material production. The Communist Party has been devoting much attention to agriculture ever since Soviet power was established. Party decisions have stressed more than once that the accelerated development of agriculture is of tremendous significance to the entire work of building communism. In recent years, since the September (1953) Plenum of the Party Central Committee, a whole system of extremely important measures to further consolidate collective farming and develop state farming, to sharply raise agricultural production as a whole, has been worked out and is being steadily implemented. Warmly supported by all working people in agriculture, as well as by the entire Soviet population, these sweeping, truly revolutionary measures have already resulted in notable successes and must yield even greater achievements in the future.

Convincing evidence of the outstanding progress made in this field in the USSR is provided by the data contained in the recently published statistical volume of the USSR Central Statistical Administration covering all phases of agriculture.

This is the first time that a statistical survey of Soviet agriculture of such scope (650 pages) has appeared, so completely encompassing the problems of agriculture in the USSR. The survey furnishes information on fixed assets and capital investments in agriculture, on mechanization and electrification, on sown area, gross harvests and crop yields, on the number and productivity of livestock and livestock output, on the volume and structure of gross and marketable output of agriculture, and on state procurements and purchases of farm produce, on labor productivity and skilled labor in agriculture, on the material well-being and cultural standards of the collective farmers. The very important data given in the survey characterize the development of agriculture over an extended period and provide comparisons with the conditions which prevailed before the Revolution.

Some of the material in this survey has never been published before. This applies to the data on fixed assets in agricultural production, the number of persons employed in the collective farms, the MTS, the RTS, state farms and state subsidiary farms, on marketable farm output, on labor productivity in the collective and state farms by Union Republics, and much more. A great many agricultural indices by republics, territories, regions and economic districts of the Russian Federation are presented.

The data published are so varied and cover such a wide range of subjects that the survey might easily have been entitled "The Life of the Soviet Countryside."

The preface to the book notes that the survey is intended for the general reader. It will certainly become essential to workers of Party, Soviet, planning and agricultural bodies regularly connected with the planning and administration of agricultural production.

Scholars will get a deeper insight into agricultural economics. This will certainly help to reveal potential reserves for increasing agricultural output.

The significance of the survey data is enhanced by the fact that interest in Soviet agriculture, in its successes and mode of development has been growing abroad. For the first time in history, large-scale agricultural production along socialist lines has been organized in the Soviet Union, developing on a planned basis and creating unprecedented opportunities for the growth of productive forces and a rise in the living standards of the peasantry. The collective farm system has demonstrated its unquestionable superiority both to small peasant farming and to large-scale capitalist farming. The successes of Soviet agriculture, the total transformation of the Soviet peasants' life, cannot help but attract the attention and interest of working people all over the world.

The survey opens with a summary section containing the principal indices of agricultural development, characterized in greater detail in subsequent chapters. The very first page of this section is bound to focus the reader's attention. The decisive significance of the Decree on Land to the development of Soviet agriculture is well known; notwithstanding this, every reader will carefully note the relative distribution of farm land in prerevolutionary Russia and in the Soviet Union. Prior to the Revolution, 152 million hectares of farm land belonged to the landlords, the tsarist family and the monasteries, and more than 80 million hectares belonged to the kulaks. Today, the peasants — united in collective farms — control 367 million hectares of farm land and 185 million hectares belong to state farms and other state agricultural enterprises.

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* A review of the Statistical Abstract Sel' skoe Khoziaistvo SSSR, Gosstatizdat, 1960.

No less striking are the figures characterizing the socialist reconstruction of agriculture in the USSR which are found in the following pages. From small peasant farms, with their primitive level of development, our country has advanced to highly mechanized socialist farming conducted on the largest scale in the world. The entire mode of farm life has changed radically; living standards in the village have vastly improved, culture and education have been brought within the reach of all working people in agriculture.

The socialist system of economy has become the only form of farming in the USSR. At the beginning of this year there were 6,500 state farms, all of them large-scale agricultural enterprises, and 54,600 collective farms. In place of the wooden plows, harrows and other primitive implements with which the peasants before the Revolution literally scratched the soil instead of tilling it, the collective and state farms — thanks to the socialist industrialization of the country — at the end of 1959 owned 1,899,000 tractors (in terms of 15 h.p. units), 492,000 grain harvesting combines, millions of other complex farm machines, and 729,000 trucks and cars. The socialist reorganization of agriculture in the USSR and its steady technical advances have tremendously increased labor productivity. This has made it possible to expand agricultural production considerably, despite the fact that the industrialization of the country has caused a considerable shift of labor from the villages to the cities.

The latter half of the summary section of the survey is devoted to basic indices of the development of state and collective farms and machine tractor stations.

Important measures have been taken in recent years to strengthen and develop the state farms. Not only have 2,000 new state farms been set up since the September 1953 Plenum of the Party Central Committee, but the management of state farms has also been substantially improved. As a result of the establishment of new state farms, mainly in the virgin and long-fallow land areas, and the radical improvement of land cultivation by the old stat farms, the entire crop acreage of state farms grew from 15,200,000 hectares in 1953 to 53,900,000 hectares in 1959. Measures have been taken to intensify farming methods on the state farms and to increase their livestock. The number of large horned cattle alone has increased from 3.4 million to 10.5 million.

In 1953 the state farms used 165,000 tractors, in 1959 — 597,000 (in terms of 15 h.p. units).

State farms today are large, highly mechanized agricultural enterprises, veritable factories of farm produce. The average state farm in 1959 had 23,500 hectares of arable land, 92 tractors, and 1,633 head of large horned cattle. The average number of workers per state farm was 610.

As a result of the measures taken to develop and consolidate state farming the share of state farms in all government procurements and purchases of farm produce increased between 1953 and 1959 as follows: grain, from 12% to 38%; milk, from 17% to 25%; eggs, from 13% to 24%; wool, from 16% to 28%.

In the further development of collective farming a tremendous part was played by the restoration o the Leninist principle of providing the collective farmers with a material stimulus to develop socia production, a principle which had been violated in the past. Higher prices paid by the government fo agricultural produce served as a powerful impetus to the growth of all branches of collective farming

The volume contains some highly interesting da on average price indices of agricultural produce purchased by the government from the collective farms, collective farmers, workers and employee Taking the procurement-purchase prices of all farm produce procured by the government in 1952 as equivalent to 1, the price index in 1959 was 3.0 Grain prices as a whole rose more than 7.4 times corn — 10 times, buckwheat — almost 14 times, and millet — 13 times. The prices of flax fiber an sugar beet doubled, sunflower seed prices rose almost 9 times, potatoes — more than 8 times, livestock — more than 12 times, milk and milk products — 4 times.

The cash incomes of collective farms increased sharply and, as a result, indivisible funds grew, collective farmers' earnings and their living standards rose. While in 1953 the money incomes of collective farms amounted to 49.6 billion rubles and the value of their indivisible funds to 69.8 billion rubles (in prices of the respective years), in 1959 money incomes amounted to 136.9 billion rubles and indivisible funds to 185.7 billion rubles (in the latter case there was a reassessment of livestock).

The indisputable advantages of large-scale farming as compared with small-scale became clear even in the early years of collectivization. As time went on and the material-technical resources of the collective farms grew, these advantages became even more apparent. For this reason a movement for enlarging the collective farms originated and spread in the postwar years. At present, the collective farms are also characterized by large units, making it possible to use machinery much more efficiently, introduce modern methods of operation, and concentrate investments. In 1959 only 7.8% of the collective farms had less than 300 hectares of sown area, while in 68% of all the collective farms the sown area exceeded 1,000 hectares, and 11% had more than 5,000 hectares of sown area.

The data comparing the growth of agricultural output in the USSR and the USA is very impressive. In 1959 the agricultural output index (with 1949-1953 taken as 100) was 158 in the USSR and only 120 in the USA. The average annual rate of growth in gross output during the last six years (1954-1959) was 7% in the USSR and 2.3% in the USA.

The next section of the survey is devoted to gross and marketable output. In 1959 the gross agricultural output of the USSR (in comparable prices) stood at 218% of the 1913 level, i.e., it had more than doubled. The advance would have been even greater were it not for the dire consequences of the wars forced upon the country.

As a result of the socialist reconstruction of agriculture its marketable output has increased faster than its gross output. In 1959 the marketable output of agriculture in the USSR amounted to 291% of the 1913 figure, i.e., it had nearly trebled. Compared with the prewar year 1940, marketable output was up 76%, livestock products showing a particularly big gain — 116% — compared with 51% in field husbandry. The increase in marketable produce was particularly marked in the case of the collective and state farms and other state agricultural enterprises. Livestock products showed a 299% increase, field husbandry products rose 58%, with 113% as the overall increase for these units.

Even before the war government procurements and purchases of grain, sugar beet and sunflower seeds (not to speak of cotton) depended almost entirely upon the output of collective and state farms. At present the collective and state farms have also become a decisive factor in the supply of livestock products. In 1959 they accounted for 83% of total government procurements and purchases of livestock and poultry, 92% of milk and milk products, 1% of eggs, and 87% of wool. The full significance of these figures will become clear if the extent to which government procurements and purchases of livestock products have grown during the last few years is realized: in 1959 7.6 million tons of livestock and poultry (in live weight) were procured and purchased in all categories of agricultural units, compared with 3.6 million tons in 1953; the corresponding figures for milk and milk products are 25 million and 10.6 million tons; for eggs — 5.7 billion and 2.6 billion; for wool — 354,000 and 197,000 tons respectively.

The growth of procurements stemmed not only from the increase in farm output itself but to a substantial increase of its marketable share, particularly the marketable share of the output of collective and state farm social economies.

The data on marketable agricultural output published for the first time in this volume is of great interest. In 1959 the marketable share of the output of the collective and state farm social economies and of other state agricultural enterprises amounted to 64% compared to 56% in 1953, while the marketable share of the output of all categories of agricultural units was 49% and 45% respectively.

The sections characterizing crop cultivation and livestock raising occupy the central place in the volume.

The crop cultivation section opens with a description of the Soviet Union's land resources and a distribution of farmland by type of user.

The book presents in detail the dynamics of sown area as a whole and by individual crops. The sown area of the USSR in 1959 amounted to 196.3 million hectares compared to 118.2 million in 1913, an increase of 66%. Grain crops account for more than 60% of the total, technical crops — 6.3%, potatoes, vegetables and melons — 5.9%, feed crops 26.8%.

An analysis of the data on sown area presents a most interesting picture of the changes that have taken place in the location of the sown area of many crops. The proper location of crops and agricultural specialization are among the most important reserves for the further growth of farm output. The specialization of Soviet agriculture has been decisively influenced by the cultivation of 36 million hectares of virgin and long-fallow land in the Eastern regions of the country. The creation of a great new grain center in the East has produced a substantial change in the structure of agriculture in other parts of the country and made it possible to improve the use of their natural resources. The collective and state farms of the Ukraine, North Caucasus, the Central-Black Soil regions and the non-black soil areas have greatly extended their areas of sugar beet, sunflower seeds, flax, corn and feed, and are developing stock raising more intensively.

A very important factor in increasing gross harvests of grain crops and improving the supply of succulent and concentrated feed for livestock, apart from the plowing up of the virgin and long-fallow lands, has been the increase in corn production. In 1953 the total area under corn sown for grain, green fodder and silage did not exceed 3.5 million hectares. In 1957 as much as 18.3 million hectares were sown to corn, and in 1959 – 22.4 million hectares. The new approach to the use of corn as a plant valuable not only for grain but for fodder as well has made it possible to extend corn crops far to the North and East.

In the interests of the growing livestock industry feed crops have had to be greatly extended. The total area under feed crops, including grass, reached 52.6 million hectares in 1959 compared to 28.7 million hectares in 1953.

The volume contains data on the sown area of special strains. Their great importance in increasing crop yields is well known. Many collective and state farms continue to operate without using seeds of special strains, however. A few years ago the USSR Central Statistical Administration published an interesting volume on special strains, showing not only the total area under these crops but the area under each variety. Unfortunately such data is absent from the present volume. Inclusion of data on the area under the most widespread varieties of special strains, while slightly enlarging the present volume, would have furnished a more complete picture of agricultural production.

It is well known how much attention the Party has given lately to accelerating the development of the chemical industry, particularly to increasing the production of mineral fertilizers as a most important means of increasing yield. In the USSR as a whole the use of mineral fertilizers per hectare of plowland increased from 16.5 kilograms in 1940 to 56.7 kilograms in 1958. The increase in the use of mineral fertilizers was especially marked in cotton, sugar beet, flax and other technical crops. The volume also contains data on the use of local fertilizers by collective farms. Here, too, notable progress has been made. However, more attention must be devoted to these fertilizers if increased harvests are to be secured.

The section on field husbandry closes with detailed data on gross harvests, crop yields and government procurements of the basic crops. One of the specific features of farming is its great dependence on natural conditions. True, as efficiency grows and mechanization spreads agriculture's dependence on natural conditions gradually diminishes. But the latter still play a very great – even decisive at times – role in the size of the harvest. That is why the value of the survey is substantially enhanced by the inclusion of data on gross harvests and crop yields, not only by years but by five-year averages, thus reducing the influence of weather conditions on the size of harvests in individual years.

A comparison of the data on gross harvests by five-year periods shows what remarkable successes Soviet agriculture has scored, particularl in recent years. Average annual gross harvests c basic crops during the last two five-year periods are shown in the table on the top of the following page.

The gross harvests of a number of crops (whea corn, technical crops) have increased substantiall since the Revolution. Such is not the case with al crops, however. In 1913 old Russia produced 2.5 million tons of millet and 1.1 million tons of buckwheat; in 1956 their harvests were 4.6 and 1.3 million tons respectively. Since then, however, these harvests have declined drastically, so that i 1959 only 1.3 million tons of millet and about 0.4 million tons of buckwheat were produced. These reductions have no justification whatsoever. The absence of any progress in leguminous crops may also be noted.

There have been considerable changes in the structure and volume of feed crops. Ensilage crops, especially corn, which is harvested with th cobs in the milk-wax stage of ripeness, have become predominant in recent years. The gross ha vest of ensilage crops at all categories of farms 1959 amounted to 170 million tons compared to on 5.2 million tons in 1940.

The yield of most crops has increased in recen years. This is especially true of cotton. The Soviet Union now ranks first in the world in cotton yield. The increase in technical crop yields has been a direct result of the close attention paid to the improvement of methods of cultivation, as wel as to the extensive use of mineral fertilizers in t case of these crops. At the same time it must be admitted that the yields of most crops in the colle tive and state farms are still low. How great the possibilities are for increasing crop yields in the collective and state farms may be seen from the examples of many of the more advanced farms. The struggle for higher yields and the extensive a plication of the methods used by the advanced far will result in a further increase of agricultural o put.

The Soviet Union has far outstripped the USA i the rate of growth of grain production, but it is still behind in gross grain harvests, as the data c

Gross Harvest (Grain Yield) of Agricultural Crops in All Categories of Farms

	Annual Average		1959	Annual average for 1954-1958 in % of annual averages for 1949-1953	1959 in % of 1953
	1949-1953	1954-1958			
Gross harvest, million tons:					
Grain	80.9	113.2	125.9	140	153
Sugar beet	21.1	35.5	43.9	168	190
Flax fiber	0.23	0.40	0.36	176	224
Potatoes	75.75	83.43	86.56	110	119
Oil-producing crop seeds	2.51	3.86	3.41	154	110
Including sunflower seeds	2.04	3.42	3.02	167	115
Vegetables	10.0	14.0	14.8	140	130
Fruits and berries	2.23	2.83	3.46	127	160
Grapes	0.84	1.34	1.73	159	166
Government procurements and purchases of raw cotton, million tons	3.49	4.20	4.68	120	121

p. 222 show. This stems from a lag in feed production, which naturally also affects meat production.

In posing the task of achieving a sharp increase in agricultural production so as to provide an abundance of food for the population and of raw materials for industry, the Party could not help but pay close attention to the problem of livestock raising, his very important and most difficult branch of agriculture, which was also the most neglected branch in the past. Broad perspectives for a rapid expansion of livestock production were opened up by the decisions of the September 1953 Plenum of the Party Central Committee. This Plenum adopted a new approach to the development of this branch of agriculture, regarding it as indissolubly linked with the general problems of agricultural development, particularly with the problem of increasing grain production.

The section devoted to livestock opens with data on the number of livestock by types, categories of farms, sex and age groups.

The total number of livestock in the USSR in recent years as compared with that before the Revolution and the prewar years is shown by the following figures (within the present boundaries of the country):

Number of Livestock in All Categories of Farms on January 1
(millions of head)

Years	Large horned cattle	Including cows	Pigs	Sheep	Goats	Horses
1916	58.4	28.8	23.0	89.7	6.6	38.2
1929	58.2	29.2	19.4	97.4	9.7	32.6
1940	47.8	22.8	22.5	66.6	10.1	17.7
1950	58.1	24.6	22.2	77.6	16.0	12.7
1954	55.8	25.2	33.3	99.8	15.7	15.3
1959	70.8	33.3	48.7	129.9	9.3	11.5
1960	74.2	33.9	53.4	136.1	7.9	11.0

The increase in the number of livestock belonging to the socialized sector has been far in excess of that in the country as a whole. While the total number of cows in the country on January 1, 1960 was 35% above the January 1, 1954 level, the increase in the collective and state farms was 66%; in the case of pigs the general increase was 60% and in the collective and state farms it was 114%. Social ownership of livestock has become predominant in the country. While in 1934 the collective and state farms and other government enterprises owned only 38% of the large horned cattle (including 25% of the cows), 55% of the pigs and 49% of the sheep in the country, in 1960 these organizations owned 66% of the large horned cattle (including 50% of the cows), 74% of the pigs and 79% of the sheep.

Implementation of the tasks set by the Party for increasing livestock output under the Seven-Year Plan requires very rapid annual increases in the number of livestock. While in land cultivation the goals set by the 21st CPSU Congress will be met chiefly by increasing crop yields, and to a lesser degree by an extension of sown area, in increasing livestock output the accent must be on a growth in the number of livestock, an increase in the number of animals per unit of land area, accompanied by a simultaneous growth of productivity.

An analysis of the data on the number of livestock per 100 hectares of agricultural land shows that in many parts of the country there are ample opportunities for raising this index. Thus, while the Latvian SSR and the Lithuanian SSR have 19 cows per 100 hectares of farm land, the Estonian SSR has only 15 cows per 100 hectares, although the natural and economic conditions in all three republics are very much the same.

Unfortunately, in presenting data on the number of livestock the book fails to classify them by breeds. The general information in the volume or the share of pedigreed stock fails to fill this gap. Highly productive and valuable breeds of stock ar being raised in this country, many of them of Soviet origin, and data on the number of livestock, a least by basic breeds, would be of considerable interest. Data on the number of beef cattle would b particularly useful. It must not be forgotten that an important source of beef production is the specialization of farms in the steppe parts of the cou try in beef cattle raising. An analysis of America agriculture shows that beef cattle raising is the most important source of meat production there. In recent years there has been a marked tendency to increase the number of beef cattle in the USA.

The data on livestock output provide clear evidence of the successful implementation of the Party's measures designed to bring about a marke advance in agriculture and to increase agricultura production. This data is given below:

Production of Basic Livestock Products

Year	Meat and fat in slaughter weight (million tons)	Including pork	Milk (million tons)	Eggs (billion units)	Wool (thousand tons)
Annual average:					
1909-1913	4.8	1.7	28.8	11.2	192
1949-1953	4.9	1.7	35.7	12.9	198
1954-1958	6.9	2.9	48.7	20.1	272
1959	8.9	3.6	62	25	355

As already stated, the increase in the number of socially-owned livestock in the collective and state farms has made it possible to increase their share in total livestock output and, particularly, in government procurements, in which the collective and state farms at present play the decisive role in supplying the country not only with crop output but with livestock products as well. This is an outstanding accomplishment of Soviet agriculture in recent years.

The achievements of Soviet livestock raising, its rapid development, have enabled the advanced collective and state farms of the country to pose the task — warmly supported by the entire nation — of increasing the output of livestock products t a level which will shortly permit us to catch up with the USA in per capita production. The natio wide emulation drive launched with this object in view has produced remarkable results. Data published in the volume under review show that by 1958 the Soviet Union had already caught up with the USA in total milk production, and in the following year had outstripped that country in per capita butter output.

The problem of catching up with the American level of meat production is a more difficult one. In 1959 the output of meat in our country amounted to 8.9 million tons, a gain of 53% over 1953, but it was still far short of the population's demand for meat. It will be recalled that the Seven-Year Plan calls for the production of 16 million tons of meat in 1965. To bring per capita meat production to the American level, some 20 or 21 million tons of meat must be produced. The December 1959 Plenum of the Party, while voicing confidence that the meat production target of the Seven-Year Plan would be reached ahead of schedule, called upon all Soviet farmers to increase meat output by 4-5 million tons over and above the Seven-Year Plan figures as part of a socialist emulation pledge. The importance of this task is self-evident.

The data on livestock productivity given in the volume indicate great qualitative changes in Soviet livestock raising in recent years. For a long time the average annual milk yield per cow in collective farms was about 1,000 kilograms. In 1953 the average was 1,016 kilograms. During the last six years the milk yield per collective farm cow has doubled, the average for 1959 being 2,004 kilograms. If we take both collective and state farms, the average yield per cow increased from 1,157 to 2,067 kilograms between 1953 and 1959.

The reader of the volume will be keenly interested in the figures relating to fixed assets and investments in agriculture.

This section of the survey illustrates how consistently the Party has been strengthening the material-technical base of agriculture. While state and collective farm investments in agriculture (in comparable prices) amounted to 190.1 billion rubles during the period 1918 to 1953, in the course of the next five years alone (1954-1958) they amounted (in comparable prices) to 210.4 billion rubles, or an annual average of 42.1 billion rubles. In 1959 total investment in agriculture amounted to 54.8 billion rubles.

The total value of fixed assets in agriculture in 1959, exclusive of livestock, was more than three times the 1940 level, the state farms showing a particularly marked gain.

The survey presents data on elevators and grain warehouses built and opened in the country as a whole and in the virgin and long-fallow areas in particular, as well as data on livestock and poultry premises built by collective and state farms and material on cultural construction. Most of this data appears for the first time. Unfortunately, there are no figures on housing construction in the countryside, which is of considerable significance, of course, in indicating the changes taking place in the life of the Soviet village.

The section dealing with mechanization and electrification of agriculture gives a clear picture of the reconstruction of Soviet farming on the basis of modern technology. In 1917 work animals accounted for 99.2% of all power used in Russian agriculture (in terms of mechanical power); in 1960 mechanical motors provided 96.3% of all power employed in agriculture, of which tractors represented 30.9% and motor cars 42.8%.

The volume contains information on the manufacture of the principal types of farm machinery. This greatly heightens the value of the book. Mass production of tractors and farm machines, mostly of the latest makes, has substantially changed the character of the fleet of machines employed in the collective and state farms. The stock raising farms have also greatly improved their stock of machinery and mechanisms. An important role in improving the quality of agricultural work and raising labor productivity has been played by the extensive introduction of mounted machines, which are more productive and take less metal to build than trailer implements. Of the 154,800 tractor plows manufactured in 1959, 93,100 were of the mounted type, and the same applies to 106,700 of the 121,500 tractor cultivators.

From the data published in the volume we can see that while major operations, such as plowing, sowing and harvesting of grain, have been almost completely mechanized for some years now, other operations are still done largely by hand. The designing of a whole system of new machines and their extensive manufacture have made it possible in recent years to extend the mechanization of many operations in agriculture. Thus, mechanization of fiber-flax planting in the collective farms increased from 52% in 1953 to 83% in 1959, mechanization of potato planting from 25% to 55%, and mechanization of silage making from 48% to 84% respectively. Mechanization of collective farm livestock raising has also been extended. In 1959 30.7% of all cattle and 36.8% of all pigs were owned by collective farms which had a mechanized water supply, while in 1953 only 6.6% of the cattle and pigs were at such farms.

A highly interesting section of the book is the one dealing with the problem of employment and skilled labor in agriculture. The average number of persons employed in the country's agriculture in 1959 (exclusive of those members of collective farmers' families and factory and office workers engaged in their own subsidiary farm plots) was 26.2 million. Of this number 21.5 million worked on collective farms, 4.5 million on state farms and subsidiary government agricultural enterprises, and 0.2 million at the MTS and RTS. Taking into account the work done by members of collective farmers' families and factory and office workers in their own subsidiary farm plots, the total number of persons employed in agriculture in 1959 averaged 33 million.

This army of farm workers is faced with the vitally important task of raising the productivity of labor. It may be recalled that the target figures approved by the 21st Party Congress for the economic development of the USSR for the period 1959 to 1965 call for a doubling of labor productivity during this seven-year period at collective farms and a 60 to 65% increase at state farms. The volume gives details on average labor inputs at collective and state farms in producing principal types of farm products in recent years.

The data on skilled labor employed in collective and state farming in instructive. The spread of mechanization in Soviet agriculture has made the mechanic the central figure. While in 1940 the number of tractor drivers, tractor team leaders and assistant leaders, combine operators and car drivers in collective and state farms and in the MTS and RTS was 1,401,000, in 1959 their number had increased to 2,401,000.

The large-scale and highly mechanized character of Soviet collective and state farms require a highly qualified management. In this respect, too, drastic changes have occurred since 1953.

Upwards of 366,000 specialists with higher and specialized secondary education were employed directly on the collective and state farms and in the MTS and RTS in 1959, compared with 114,000 in 1953. If we take all agricultural specialists with higher and specialized secondary education, including those employed in administrative institutions and scientific research, the total at the end of 1959 was 530,000.

A special section of the volume deals with the living and cultural standards of collective farmers. It contains a wealth of material illustrating the tremendous changes that have occurred in the Soviet countryside.

All Soviet people will be pleased to learn that in 1959 the incomes — in money and kind — of working peasants from the collective farms and from their own plots of land, minus taxes and duties, were 4.5 times the 1913 level (per working person), while their real incomes — taking into account free education and medical services, pensions, grants and other payments and privileges at state expense — including incomes used to increase the indivisible funds and supplies of the collective farms, had increased by almost 7 times. The book cites the results of investigations of collective farmers' budgets showing how much the food consumption, clothing, footwear and cultural standards of the peasants have improved.

Data published in the volume also reveal the great cultural revolution that has taken place in th Soviet village. While in 1914-1915 there were 109,000 schools in the countryside, practically all of them primary schools, their number has now grown to 170,000; more than 16,000 of them are secondary schools. The rural schools today have 16 million students, compared with 7.4 million before the Revolution. There were more than 108,0 public libraries in the countryside in 1959 with 38 million books. The number of hospital beds in the countryside in 1959 was 6.3 times the 1913 level, while the number of doctors (exclusive of dentists) went up 5.8 times, and the number of medical assistants 16.8 times.

The statistical survey closes with a lengthy section giving agricultural data by administrative-territorial divisions, and enabling the reader to analyze many questions in relation to the individua republics, territories, regions and economic area

In summing up, it may be said that the statistical abstract on Soviet agriculture illustrates by a vast amount of factual material the path along whi Soviet agriculture has travelled and its indisputab advantages over the agriculture of any capitalist country, including the USA.

We would like to make certain suggestions to th compilers of the volume, especially with regard t what could be usefully added. In the field husbandry section data on a larger number of crops should be presented. There is no data, for instance, on the sown area of sorghum, melons, mar of the oil-producing crops, ether-oil, perennial an annual grasses by types, etc.

It would also be useful to have data on the processing of farm produce. A considerable part of th meat, milk and animal fats is processed by industry, and it would be only natural for the survey to present data on the production of sugar, canned fr and vegetables, cereals, flour and other products. Figures on the production of vegetable oils by gra combined fodder, fish and meat meal, etc., would also be of great interest.

The survey presents data on the rise in living standards among the peasants but has nothing to say about the manner in which the growth of agricultural output in recent years has affected the food supply of the urban population. The value of the survey would only be enhanced if it included data on the dynamics of the sale of farm produce to the population.

A serious shortcoming of the survey is the fact
at the data for a number of indices are limited
the last few years. For analytical purposes the
llest possible comparative data over an extended
eriod is essential.

Some data comparing Soviet and American agri-
ulture is presented in the volume, but this mate-
ial should have been more comprehensive and
etailed.

In the next edition of the survey it would be desirable to consider adding a section of foreign agriculture and world production of principal agricultural products.

On the whole, however, the conclusion may be drawn that the staff of the Agricultural Statistics Department of the USSR Central Statistical Administration, which prepared the survey under review, accomplished a big job in publishing a valuable and necessary book, one which will undoubtedly find a broad circle of readers.

. SKOVORODA

(CONTINUED FROM PAGE 23)

p for sale of all sorts of garments. There will
lso be shops to sell commodities at standard
rices and home deliveries of food products will be
xpanded.

The implementation of the decisions of the July
1960) Plenary Meeting of the Party Central Com-
nittee and the decision of the Committee and the
SSR Council of Ministers, "On Measures for the Further Improvement of Trade," will be important contributions to the development of commodity circulation and a fuller satisfaction of the growing requirements of the population.

Footnote

(1) Karl Marx and Friedrich Engels, Collected Works, Vol. XV, p. 42 (Russian edition).

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reation of large, combined electric power systems,
he equipping of all branches of the economy with
nodern electrical machinery, apparatus and de-
ices, are important means of carrying out the decisions of the July (1960) Plenum of the Party Central Committee and accelerating the creation of the material and technical base for communism.

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